1858 ① digestion
② vitamins ~~[illegible]~~
④ foods ⑦ human diet
⑤ acid base factors
⑥ human nutrition
⑦ high concentration foods
⑧ low " foods
④ supplementary feeding
⑤ disease management
⑥ human diseases

TLM

Complete Food Tables

BRIDGES' FOOD AND BEVERAGE ANALYSES

MARJORIE R. MATTICE
A.B., Sc.M.

Bridges' Dietetics For The Clinician

FIFTH EDITION, THOROUGHLY REVISED AND EDITED

By HARRY J. JOHNSON, M.D., F.A.C.P.

Assistant Clinical Professor of Medicine, New York Post Graduate Medical School; Assistant Attending Physician to the hospital, Associate Attending Physician to the Dispensary, Chief of the Nutrition Clinic, New York Post Graduate Hospital; Associate Attending Physician to the Hospital and Attending Physician to the Dispensary, French Hospital New York; Attending Physician, Department of Correction Hospitals New York City.

LONDON
HENRY KIMPTON
25 BLOOMSBURY WAY, W.C.1

1858

PRINTED IN AMERICA

PREFACE TO THE FIFTH EDITION

In preparing the fifth edition of Bridges' Dietetics for the Clinician, the editor made a sincere effort to maintain the general form of presentation so successfully arranged by the late Dr. Bridges. It was the present editor's privilege to be associated with Dr. Bridges in practice during the time the first three editions were prepared. Because of this, he has been familiar with the contents as well as the method of presentation.

In the fifth edition an attempt was made to incorporate only the practical advances in the field of nutrition. The many contributors have been very mindful of the purpose for which the book was first written and have limited their material to that which the general practitioner of medicine, as well as the specialist, will find helpful in treating the patient.

The editor wishes to express his appreciation to the many contributors of the previous editions who have once again carefully reviewed their material and augmented this with the most recent advances. In addition there are many additional authorities whose contributions will make this edition more valuable and complete. Among these are Clarence Bandler, M.D. (Urology), Joseph Berg, M.D. (Vitamins), Harold Clark, M.D. (Rectal Disease), Joseph Eidelsberg, M.D. (Endocrinology), Clarence Fuller, M.D. (Gastro-Intestinal Disease), Edward Hartung, M.D. (Arthritis), Vincent Larkin, M.D. (Pediatrics), Ruth Lloyd, B.S., M.A. (Practical Evaluation of Food), Jerome Marks, M.D. (Gastro-Intestinal Disease), Robert McGrath, M.D. (Cardiology), Philip Roen, M.D. (Urology).

The Complete Food Tables in the appendix are recommended to the reader as a thoroughly revised reference table. This was prepared and arranged by Miss Marjorie R. Mattice, A.B., Sc.M., who is the editor of "Bridges' Food and Beverage Analyses."

H. J. J.

New York City

PREFACE TO THE THIRD EDITION

THE preparation of a new Edition was prompted by an appreciation that food classifications to date, even those included in the previous editions, have been based mainly upon the analyses of raw products. Insufficient cognizance of the analyses of foods in the edible state has rendered it necessary to present to the medical public a relatively new text-book based upon more accurate and up-to-date foundations.

The author feels that there is a greater need, than has heretofore ever existed, for a book on dietary management which is readily understandable and from which practice can be immediately instituted.

Diet therapy literature has been extensively reviewed and an assimilation made of the various dietetic proposals heretofore presented. The study of dietary fads and pet recipes of various countries, together with personal investigations into all dietary regimens, has afforded an opportunity to survey the field of dietetics. The material taken therefrom is believed to be not only physiologically sound but, from personal application, thoroughly practical.

Much of the subject matter has been augmented and rewritten. The portion devoted to the Distribution of Foods has been radically changed in keeping with the latest knowledge of foods and their nutritive, vitamin and mineral constituents. Of necessity, therefore, the majority of the menus have been rewritten, and amplified with the newer data. A number of diets for diseases of current interest have been added.

The food tables in the Appendix have been simplified and greatly augmented to render available all reliable analyses of the common as well as some of the "proprietary" foods. In no wise does the Appendix equal in volume the material to be found in "Food and Beverage Analyses."

This Edition still maintains the persistent purpose of supplying a practical addition to the armamentarium of the nutritional expert, home economist, general practitioner and hospital interne. It is hoped that it may also continue to be used in the dietetic departments of both hospitals and clinics. In the face of present day interest in nutrition and its principles, it is further hoped that the

intelligent layman may find it a helpful guide in establishing the value of any nutritional proposal.

The author has been fortunate in obtaining the aid of the following, who are specialists in their respective fields: Shailer U. Lawton, M.D., Adolescence; W. C. Spain, M.D., Allergy; J. Russell Twiss M.D., Cholecystitis; Irving A. Swanson, D.M.D., Dentistry; James J. Short, M.D., Diabetes Mellitus; George A. Blakeslee, M.D., Epilepsy; J. William Hinton, M.D., Goiter; Arthur Nilsen, M.D., Otolaryngology; Edward C. Brenner, M.D., Surgery in Diabetes; R. Franklin Carter, M.D., Surgical Conditions.

Acknowledgment and appreciation are extended to Drs. Meyer H. Freund (Rectal Conditions), Henry E. Marks (Vitamins), Terry M. Townsend (Urologic Diseases), Herman O. Mosenthal (Bright's Disease) and Carl P. Sherwin (Physiology and Chemistry of Digestion) for their extensive contributions.

Harry J. Johnson, M.D., and Louise Schutz, M.S., have furnished the section on Food Adjuncts. The material on Dermatology was supplied by Samuel Ayres, M.D. The portion on Gynecology and Obstetrics, prepared by Mortimer N. Hyams, M.D., was supervised by Walter T. Dannreuther, M.D. The author is particularly indebted to N. Thomas Saxl, M.D., for having rewritten and amplified the part on Pediatrics.

Since the author is fully aware of the inability of physicians to incorporate diet principles in the form of proper and palatable menus, this book has been prepared with aid from the Dietary Department of the New York Post-Graduate Hospital.

Appreciation is expressed to Marjorie R. Mattice, A.B., Sc.M., Assistant Director of the Biochemical Laboratory of the New York Post-Graduate Hospital, for collaborating in the preparation of the Appendix. It is conceded that without her aid and knowledge this volume would have lost a great deal of its scientific value.

Appreciation is hereby expressed to Stella Scott, R.N., for her general coöperation and to those contributing to the former editions who have continued their efforts and interests to make this Third Edition possible. The assistance and criticisms of my many associates, friends and patients have been most hêlpful.

Finally, full credit and appreciation is given to Marie T. Bridges for her irreplaceable aid and support.

M. A. B.

New York.

CONTRIBUTORS

AYRES, SAMUEL, Jr., M.D., F.A.C.P.
Professor of Dermatology, College of Dentistry, University of Southern California; Formerly Professor of Dermatology and Syphilology, College of Medical Evangelists, Loma Linda, Los Angeles.

BANDLER, CLARENCE G., M.D.
Professor of Clinical Urology, Executive Officer, Department of Urology, New York Post-Graduate Medical School; Director of Urology at New York Post-Graduate Hospital, New York City.

BERCOVITZ, Z., M.S., M.D., Ph.D., F.A.C.P.
Formerly Asistant Clinical Professor of Medicine, New York, Post-Graduate Medical School; Assistant Attending Physician to the Hospital and Attending Physician to the Dispensary, New York Post-Graduate Hospital; Associate Attending Physician, Welfare Hospital for Chronic Diseases; Associate Attending Physician, Second (Cornell) Medical Division, Bellevue Hospital; Consultant in Tropical Medicine, Ellis Island Hospital.

BERG, JOSEPH, M.D.
Assistant Physician, University Hospital, New York University-Bellevue Medical Center.

BLAKESLEE, GEORGE A., M.D.
Visiting Neurologist, St. Elizabeth's Hospital, St. Joseph's Hospital and Beekman Street Hospitals; Consulting Neurologist, University Hospital, New York.

BRENNER, EDWARD C., M.D., F.A.C.S.
Formerly Associate Clinical Professor of Surgery, New York Post-Graduate Medical School; Associate Attending Surgeon, New York Post-Graduate Hospital; Director of Surgery, Riker's Island Hospital; Director of Gynecology, Detention Hospital; Attending Surgeon, Midtown Hospital; Consulting Surgeon, Hunt's Point Hospital.

BRUGER, MAURICE, M.Sc., M.D., C.M., F.A.C.P.
Associate Professor of Medicine, New York University Post-Graduate Medical School; Chief, Division of Pathological Chemistry, Acting Director of the Medical Research Laboratory and Attending Physician, University Hospital, New York University-Bellevue Medical Center.

CARTER, R. FRANKLIN, M.D., F.A.C.S.
Clinical Professor of Surgery, University Hospital, New York University-Bellevue Medical Center; Attending Surgeon to the Hospital and Chief of the Surgical Service of the Clinic for the Study of Diseases of the Liver and Biliary Tract, University Hospital, New York University-Bellevue Medical Center; Consulting Surgeon, Gouverneur Hospital; Visiting Surgeon, Bellevue Hospital; Author (with J. R. Twiss and C. H. Greene): Diagnosis and Management of Diseases of the Biliary Tract, 1939.

CLARK, HAROLD E., M.D.
Associate Clinical Professor of Surgery, New York University; Associate Attending Surgeon University Hospital; Associate Attending Surgeon Bellevue Hospital; Chief Rectal Surgery University Hospital, O.P.D.

EIDELSBERG, JOSEPH, M.D.
Associate Clinical Professor of Medicine at New York University Post-Graduate Medical School; Associate Attending Physician at the University Hospital and Chief Physician Endocrinology at the University Hospital Out-Patient Department.

FULLER, CLARENCE, M.D.
Associate Clinical Professor of Medicine, Post-Graduate Medical School, New York University-Bellevue Medical Center; Attending Physician and Director of Gastroenterology, University Hospital, New York University-Bellevue Medical Center; Visiting Physician, Gouverneur Hospital; Attending Physician, St. Clare's Hospital.

HARTUNG, EDWARD F., M.D.
Associate Clinical Professor of Medicine, Associate Physician, Chief of the Arthritis Clinic, New York University-Bellevue Medical Center.

HINTON, J. WILLIAM, M.D., F.A.C.S.
Professor of Surgery and Chairman Department of Surgery, Post-Graduate Medical School, New York University-Bellevue Medical Center; Director of Surgery Service, University Hospital; Director, Fourth Surgical Division, Bellevue Hospital.

HYAMS, MORTIMER N., M.D., F.A.C.S.
Associate Clinical Professor of Gynecology, New York University-Bellevue Medical Center University Hospital; Attending Gynecologist to the Hospital and Chief of Clinic, Gynecology Service, New York University-Bellevue Medical Center University Hospital; Attending Gynecologist and Obstetrician, Beth David Hospital; Attending Gynecologist, Beth Abraham Home for Incurables; Consulting Gynecologist and Obstetrician, Horton Memorial Hospital, Middletown, New York.

LARKIN, VINCENT DE PAUL, M.D.
Assistant Clinical Professor of Pediatrics, Post-Graduate Medical School, New York University-Bellevue Medical Center; Assistant Attending Pediatrician University Hospital; Associate Attending Pediatrician at St. Clare's Hospital; Assistant Attending Pediatrician at St. Francis Hospital, Bronx, New York.

LLOYD, RUTH E., B.S., M.A.
Assistant Professor of Nutrition, Skidmore College Department of Nursing; Therapeutic Dietitian at the Post-Graduate Medical School, New York University, New York City.

MARKS, JEROME A., M. D.
Instructor at New York Post-Graduate Medical School; Gastrœnterologist and Physician at Harlem Hosptial; Gastrœnterologist at Downtown Beekman Street Hospital, New York City; Assistant Physician at New York Post-Graduate Hosptial and Associate Physician at New York Post-Graduate Hospital Out Patient Department.

MATTICE, MARJORIE R., A.B., Sc.M.
Formerly Assistant Professor of Pathological Chemistry, Department of Medicine, New York Post-Graduate Medical School, Columbia University; Chief Chemist, New York Post-Graduate Hospital; Consultant Chemist, Department of Correction Hospitals, City of New York. Author: Chemical Procedures for Clinical Laboratories, 1936.

McGRATH, ROBERT, M.D.
Assistant Professor of Clinical Medicine, New York University Post-Graduate Medical School; Associate Attending Physician, University Hospital, New York University-Bellevue Medical Center.

MOSENTHAL, HERMAN O., M.D., F.A.C.P.
Consulting Physician, Fourth Division, Bellevue Consulting Physician, University Hospital, (formerly New York Post-Graduate Hospital).

NILSEN, ARTHUR, M.D.
Formerly Professor of Clinical Otolaryngology, and Executive Officer, New York Post-Graduate Medical School; Attending Otolaryngologist and Director of Service, New York Post-Graduate Hospital and Dispensary.

ROEN, PHILLIP R., M. D.
Instructor at New York Post-Graduate Medical School, Department of Urology; Assistant Urologist at New York Post-Graduate Hospital Out Patient Department; Junior Assistant Urologist at St. John's Hospital, Long Island City, New York.

SHERWIN, CARL P., M.A., M.S., D.Sc., M.D., Dr.P.H., LL.D.
Director of Metabolic Service, St. Vincent's Hospital; Associate Physician, French Hospital; Consultant Physician, Author (with Benjamin Harrow): Chemistry of the Hormones, 1934; Text-Book of Biochemistry, 1935.

SHORT, JAMES J., M.D., F.A.C.P.
Associate Professor of Medicine, College of Medical Evangelists and Director Internal Medicine, Graduate School; Attending Physician White Memorial Hospital, Glendale Sanitarium and Hospital, Behrens Memorial Hospital, Los Angeles County General Hospital; and Consulting Physician to the Birmingham Veterans' Administration Hospital, and Member of the Deans' Committee for the Los Angeles Veterans' Administration Hospitals.

SPAIN, WILL COOK, B.A., M.D., F.A.C.P.
Clinical Professor of Medicine, Post-Graduate Medical School, New York University-Bellevue Medical Center; Chief of Allergy Service, University Hospital, New York University-Bellevue Medical Center; Consultant in Internal Medicine, John T. Mather Memorial Hospital, Port Jefferson, New York.

SWANSON, IRVING A., D.M.D.
Visiting Attending Dentist, Harlem Eye and Ear Hospital; Instructor in Oral Surgery and Assistant Oral Surgeon New York Medical College, Flower and Fifth Avenue Hospitals.

TWISS, JOHN RUSSELL, M.D., F.A.C.P.
Assistant Professor of Clinical Medicine, Post-Graduate Medical School, New York University; Attending Physician and (Medical Service Chief of Clinic-Biliary Tract Clinic), Graduate Hospital New York University-Bellevue Medical Center; Author (with R. F. Carter and C. H. Greene): Diagnosis and Management of Diseases of the Biliary Tract, 1939.

CONTENTS

PART I.

GENERAL CONSIDERATIONS.

SECTION I.

MECHANICS OF DIGESTION.

SECTION II.

PHYSIOLOGY AND CHEMISTRY OF DIGESTION.

Carl P. Sherwin, M.D.

SECTION III.

VITAMIN FACTORS IN THE DIET.

Joseph Berg, M.D.

SECTION IV.

CLASSIFICATION AND STRUCTURE OF FOODS.

SECTION V.

ACID-BASE FACTORS IN NUTRITION.

MARJORIE R. MATTICE, A.B., Sc.M.

SECTION VI.

PRACTICAL EVALUATION OF FOODS.

RUTH E. LLOYD, B.S., M.A.

SECTION VII.

TABULATION OF FOOD FACTORS.

SECTION VIII.

FOOD ADJUNCTS.

SECTION IX.

SUPPLEMENTARY METHODS OF FEEDING.

PART II.

THE DIETETIC MANAGEMENT OF DISEASES OF ADULTS.

SECTION I.

DISEASES AND THEIR DIETS.

APPENDIX.

INTRODUCTION.

The feeding of the sick, or *diet therapy*, is both an art and a science. To effect desired results intelligently, a knowledge is required which extends into many branches of science as well as the practice of medicine and preparation of foods. Not only must the practitioner have a knowledge of foodstuffs and their various analyses, but he must also have a complete knowledge of physiology and pathology.

Throughout centuries, in all the fields of medicine, efforts have been made to obviate empiricism and substitute specific knowledge. Though these efforts are constantly meeting greater success with each decade, it cannot as yet be stated that medicine has been reduced to a simple rule-of-thumb procedure. Certainly this is true to a very great extent in diet therapy.

In the past, the feeding of the patient was a matter left to the housewife, controlled to some degree by the physician and was based not on scientific knowledge, but generally on the whims and fancies, as well as the physical disabilities of the patient.

In the majority of pathologic conditions encountered, there is no difference of opinion in reference to the general, if not the specific, mode of diet therapy to be instituted. The result is, that aside from minor physical changes, the diet regimen is the same throughout the world. This, however, is not the case in certain other pathologic conditions. A review of the literature reveals many inconsistencies and few sound premises for the various unorthodox dietetic proposals.

Diabetes is one disease to which extensive dietetic study has been applied. To a great degree prior to the introduction of insulin, and to a much greater degree thereafter, the influence of the dietetic treatment of diabetes has been widely emphasized by the medical profession. In diet therapy, what previously was considered laboratory information has now been found by the practitioner to be of clinical importance and essential to his armamentarium.

At present, divergence of opinion renders it improbable that any single diet established for a pathologic condition will meet with universal approval. It seems advisable to propose for a diseased condition, a diet which meets the presenting changes in physiologic functions and has been proved by experience to be efficacious in accomplishing the results for which it is prescribed.

A perusal of the literature reveals a most discouraging assortment of information in reference to dietetic management. By way of illustration, the practitioner, desirous of prescribing for his patient who is suffering from some specific disease, takes recourse to his library, and as a rule generally finds the following: In one book or another he locates a diet for the specific disease. Probably about three-fourths of the material is devoted to involved chemistry, caloric details and other data having to do with foods; the remain-

ing fourth may deal with specific diets. Having found the desired disease discussed either in one-half page or in fifty pages of reading material, he then encounters one of several probabilities: a lengthy pro and con discussion of the desired diet, with frequent quotations from sources which commonly are diametrically opposed; a terse paragraph outlining the principles of a diet, frankly leaving the development of the menus to the physician; or, the omission of the underlying principles of an outlined diet, which has been enlarged for practical purposes in a very inadequate manner. All of the foregoing leaves the physician in a quandary unless he is thoroughly trained in dietary preparation and compilation.

It is one thing to realize that the pathology of a certain disease requires a high-protein or a low-carbohydrate diet. It is quite another matter for the physician, without either expert dietetic training or adequate text-book aid, to explain in detail a prescribed diet to a nurse or a worried relative.

With the marked advances, particularly in blood chemistry, it is reasonable to assume that as time progresses, the proper ordering of a diet will become a specific detailed prescription rather than a relatively gross dietetic compilation. Particular evidence of this trend is exhibited in the dietetic management of gall-bladder and liver diseases. With a better understanding of the inter-relationship and the significance of the various biliary constituents, the older ideas in reference to diet are becoming obsolete.

It is with full realization of these facts that the following dietetic information has been prepared. The material pertaining to the mechanics, physiology and chemistry of digestion has been markedly condensed and shorn of extraneous, non-practical discussion.

The metabolism of food has been clarified and presented in a minimum of space without omitting its practical applications.

For convenience, wherever possible, the various disease entities have been arranged alphabetically and the specific diets offered in orderly sequence.

The presentation of each disease has been divided as follows:

A.—A brief discussion of the physiologic and pathologic needs presented by the patient.

B.—A detailed listing of those foods to be omitted from the diet.

C.—A listing of those foods which may be taken in limited quantities.

D.—A presentation to the reader, and hence to the patient, of a series of practical edible items of food, readily obtainable, arranged in accordance with the previously outlined principles.

E.—Wherever indicated there are added a number of practical medical and culinary suggestions.

We are fully aware that there are diverse opinions as to the dietary management of many diseases. Criticism can be anticipated when any specific principle is dictated for a given disease. However, the modes of dietary treatment herein presented have proved efficacious in both hospital and private practice.

PART I.

GENERAL CONSIDERATIONS.

SECTION I.

MECHANICS OF DIGESTION.

At the risk of becoming too elementary, it is thought wise to reiterate that which might have escaped our memories during the years elapsing since medical school graduation.

Following is a brief résumé of the mechanics of digestion from the moment food is introduced into the mouth to its evacuation from the body.

MASTICATION.

The amount of chewing that food undergoes in the mouth is dependent upon the quantity of saliva, the nature of the food itself, together with the acquired habit of swallowing large or small masses. This latter factor is purely an individual characteristic.

The saliva itself serves to moisten the buccal cavity and also the ingested food, rendering the division of food easier to accomplish. Additionally, the saliva moistens and hence lubricates the esophagus.

The process of mastication is purely one of a muscular type and is subdivided into three kinds of mandibular movements: depression and elevation, projection and retraction and lateral deviation. The depression and elevation is generally associated with the lateral deviation. This combination subdivides the particles of food by both a cutting and grinding action. Projection and retraction are regulated by the motion of the tongue, resulting in the food being kept in proper dental apposition.

Extensive research has been done in testing the actual physical power exerted by the jaws. The power exhibited when measured in pounds has been astounding. This has been specifically elicited in cracking nuts.

The process of the mechanical diminution in size and the mixture with the saliva finally reduces the food to what is called the "bolus." The food, after being reduced to a size, which is dependent upon the habit of the individual, is then forcibly thrown posteriorly from the mouth, through to the pharynx and thence into the esophagus.

ESOPHAGEAL FUNCTION.

The rate of food passage, from its entrance into the esophagus to the cardiac end of the stomach, varies directly in proportion to its fluidity. Fluids pass into the stomach essentially by gravitation,

with little or no interruption. Semi-solid foods pass more slowly, propelled by peristaltic waves in the esophagus which proceed from above downward.

The time of food passage through the various portions of the esophagus is unequally distributed. A definite retardation of the food progress is observed at the lower end of the esophagus and at the cardiac sphincter.

The musculature of the esophagus, as in most of the intestinal tract, consists of smooth muscles arranged in two layers, an inner circular and an outer longitudinal.

The mechanics of the peristaltic waves apparently present areas of contractions of the circular fibers, proximal and distal to which are areas of relaxation. Hence, the bolus enters the area of relaxation behind which is the rapidly progressing area of constricted circular fibers, resulting in downward propulsion of the material. It is the presence of the food itself in the esophagus which institutes the swallow reflex which in turn is exhibited as peristalsis. Roentgen study renders these phenomena readily demonstrable.

GASTRIC DIGESTION.

Since the introduction of the Roentgen-ray the study of the mechanics of the stomach has upset many of our previous apparently well-established ideas of gastric action.

The muscular layers of the stomach are composed of an outer longitudinal and an inner circular. A third additional layer of circular fibers is present at the junction of the fundus and pylorus, which is termed the "sphincter antri pylori."

Strange to say, the amount of peristalsis observable at the cardia of the stomach is minimal. The peristaltic action, in the main, becomes definitely evident at the area of the "sphincter antri pylori" and progresses with great definiteness distally to the pylorus.

Liquids flow rapidly from the stomach through the pylorus and thenceforth downward. The passage of the food from the cardia to the pylorus is dependent primarily on its physical characteristics together with the general muscular tone and secretory power of the stomach. The rate of passage is dependent on the availability of the gastric juices and their capability of physical contact with the meal. The more fluid the gastric contents, the more rapid is the evacuation.

The food on entering the stomach assumes a restive stage in the cardia, from which it is propelled forward by the circular constrictions to the pyloric sphincter. The circular constriction occupies about twenty seconds in traveling from its site of origin to the pylorus. Coincidentally, several circular constrictions are progressing distally. These peristaltic waves force the food to the pyloric ring. The number of waves present in the stomach of a normal individual at any one time may be as many as three.

These gastric peristaltic movements mix the food with the various gastric secretions, producing a liquid known as "chyme." In this

orm the food passes through the pylorus into the first portion of he duodenum.

PYLORIC FUNCTION.

The functions of the pylorus are manifold. Contrary to the opinion of our forerunners in medicine, its opening does not await complete gastric digestion, but is constantly observed under Roentgen-rays to open as soon as food reaches the stomach. This opening s intermittent throughout the entire period of gastric digestion and continues until the stomach has been completely evacuated.

The pyloric function appears to be selective. Its facility of opening is governed by the size of the divided food particles present, as well as the nature of the food itself. It has been observed that carbohydrates begin to leave the stomach soon after their ingestion. Proteins occupy twice as much time for their evacuation while fats suffer the greatest retardation. The average meal, consisting in an admixture of all foodstuffs, in the presence of proper gastric and pyloric adjustment, should leave the stomach in four hours.

DUODENAL FUNCTION.

As food leaves the stomach it enters the duodenum, where the chyme is brought into contact with the various biliary and pancreatic secretions. The peristaltic activity in the upper portion of the duodenum is sluggish, which fact is routinely observable in Roentgen study.

The lower portion of the duodenum, on the other hand, is equipped with perhaps the most rapid peristaltic evacuative power in the gastro-intestinal tract. As a result Roentgen films rarely show a well-defined lower portion of the duodenum.

JEJUNAL AND ILEAL DIGESTION.

The musculature of the small intestine consists of two layers: a circular and a longitudinal. Due to the activity of these two layers, the mechanics of the small intestines are divided into two types, "rhythmic segmentation" and "peristaltic rush" or travel wave.

"Rhythmic segmentation" movements churn the intestinal contents, further subdividing the intestinal material. In addition, the subdivided particles are brought into intimate relationship with the absorbing surface of the mucous membrane, aiding digestion and assimilation.

The second type of small bowel activity, the "peristaltic rush" or travel wave, is mainly responsible for the downward propulsion of the intestinal contents. These waves originate in any portion of the small intestine and vary in length.

It is to be noted that the combination of these two activities unquestionably facilitates absorption from the intestinal contents, due to the fact that they tend to increase the flow of lymph and blood.

As has been observed in the upper intestinal tract, the more fluid the contents, the more rapid the downward progress. In the small intestine liquids pass with little or no peristaltic aid. The more solid material invokes the combined muscular activities aforesaid.

ILEOCECAL VALVE FUNCTION.

The ileocecal valve consists of a sphincter form of muscular tissue and two membranous flaps of unequal size. Its function is to prohibit the regurgitation of bowel contents from the cecum into the ileum. The function of this anatomical structure has frequently been the subject of controversy. Ileocecal valve incompetency has been viewed as a definitely pathological and even operable condition. Since the introduction of Roentgen-rays, the percentage of ileocecal valve incompetency, determinable by barium colon enema, has been well over 50 per cent in routinely examined patients. The frequent presence of ileocecal valve incompetency indicates the general inefficiency of the valve.

COLONIC DIGESTION.

The large intestine, or colon, is divided into four parts, namely: the cecum, adjacent to which is the appendix, the ascending, transverse and the descending portions of the colon.

The action observable in the colon differs essentially from any heretofore discussed. Whereas there are present the customary peristaltic and pendular motions, anti-peristaltic movements are to be observed for the first time in the form of normal function.

Immediately upon the entrance of the chyme through the ileocecal valve into the colon, anti-peristaltic waves direct the material into the cecum. The material is now sent forward in the direction of the hepatic flexure by peristaltic waves, where it is again thrown back into the cecum by the anti-peristalsis.

As will be recollected, the ascending colon is furnished with transverse partitions called "haustral markings." During the course of this constant whirling, the material goes from haustrum to haustrum, hence the designation "haustral churning." During this process the contents are constantly losing water into the system and the fecal material assumes a more solid consistency as it escapes into the transverse colon. The unabsorbed fluid contents naturally tend to gravitate to the cecum, as the more solid material progresses forward.

The peristaltic activity of the colon in relation to the small intestine appears to be insignificant. Long peristaltic waves carry the material, now somewhat dehydrated, into the transverse colon, through the descending colon and sigmoid, into the rectum.

The cecum, the ascending and the transverse colon tend to be a fecal reservoir. Roentgen examination generally shows fecal contents in the above-noted areas, with little or no feces in the descending colon and sigmoid.

In practice the study of the colon under Roentgen examination reveals a much lower site of those portions of the intestine than is theoretically believed. Additionally, undue angulation at the splenic or hepatic flexure is by no means uncommon. Theoretically, this angulation, as well as the aforementioned ptosis, should result in peristaltic retardation. This, however, very infrequently appears to be the case.

SIGMOIDAL FUNCTION.

In the various studies of the intestinal tract the functions of the sigmoid seem to have been studiously avoided. It provides a connecting link about 40 cm. in length between the distal portion of the descending colon and the rectum. The digestive function seems to be nil.

RECTAL FUNCTION.

The presence of fecal material in the rectum in conjunction with the long peristaltic wave, previously noted, serves as a stimulus to initiate the action of defecation. The gradually increasing mass of rectal contents stimulates the muscular responses which are required for evacuation.

By many it is thought that the close apposition of the rectal contents to the internal sphincter, coupled with the amount of distention present, is the chief telegraphic communication, hinting the need for evacuation. The control of evacuation is an acquired and voluntary one and rests in the volitional power exerted over the external sphincter.

TIME OF ALIMENTARY EVACUATION.

Obviously, the period for evacuation of the gastro-intestinal contents in the normal human is subject to many deciding factors. However, some conclusions in the majority of so-called normal individuals should be reached in order that variations therefrom may be readily recognized.

The period of *esophageal* passage is accorded as being from three to eight seconds, depending upon the fluidity of the "bolus."

In general, following the ingestion of a moderate-sized meal, the *stomach* should be completely evacuated at the end of four to six hours. The rapidity with which the meal leaves the stomach is dependent upon its own constituents. The more fluid the meal, the more rapid is the evacuation. The higher the fat content, the more concentrated the meal, the slower evacuation becomes.

The presence of gastric residue after six hours, following the ingestion of a normal meal, as evidenced by Roentgen-ray examination, gastric expression or other means, is generally a finding indicative of gastric or pyloric malfunction.

The time consumed by the passage of a meal throughout the length of the *small intestine* is short. It is approximated at three hours. Insufficient study has been given to the small intestine to render proper interpretation of retardation, or of too rapid intes-

tinal passage, to be of clinical significance. Exception to this rule is evident in the presence of obstruction or like conditions in the ileum.

The normal colon, apparently the real reservoir of the alimentary canal, requires approximately twenty-four hours for its complete emptying.

To all intents and purposes, in the presence of normal function, the human being should evacuate ingested food approximately thirty-six hours following its oral reception.

The establishment of a specific number of hours required for the normal passage of food, from the moment of its ingestion to evacuation, is subject to wide latitude. Various substances have been followed throughout the tract by Roentgen-ray examination, and varying periods have been observed between their initial presence in the stool and the complete elimination. "The time for passage of a barium sulfate meal through the gastro-intestinal tract will vary with the type of meal employed. A protein barium meal causes slight delay, a dextrose meal a moderate delay, and an olive oil meal a delay of about five hours. The times quoted below are for a standard water barium meal which consists of 5 ounces (150 Gm.) of barium sulfate and from 3 to 5 ounces (90 to 150 cc.) of water. The stomach empties in two hours and occasionally in from two and one-half to three hours, the small intestine in from two to four hours. Usually at four hours the head of the barium column enters the cecum, at the hepatic flexure of the colon in from six to seven hours, and at the splenic flexure in eight hours. Filling of the sigmoid is variable and may be between the ninth and the seventeenth hour. Usually at the end of twelve hours the barium is evenly distributed from the cecum to the middle of the sigmoid. After twenty-four hours the largest part of the barium has reached the lower sigmoid and rectum and is evacuated."– J. A. M. A., **110,** 2027, 1938.

SECTION II.

PHYSIOLOGY AND CHEMISTRY OF DIGESTION.

CARL P. SHERWIN, M.D., Sc.D.

Introduction.—Of greater importance than the mechanical phases f digestion, discussed in the preceding section, are the changes hich convert food into those chemical units adapted to physiologic eed.

The term, *food*, refers to any substance capable of supplying eat and energy to the body, and thereby promoting body function nd growth. It is convenient to divide food into two classes: 1) The energy-producing foods, which may be termed the caloric; nd (2) the accessory food substances, which yield no heat but are ssential for the proper function of body tissues. The caloric foods re the carbohydrates, proteins, and fats. In addition to these, ater, inorganic salts (frequently designated as "minerals"), and itamins are of paramount importance to vital processes despite the act that certain of these chemicals occur in infinitesimal amounts.

As far as is known, *digestion* involves only hydrolytic splitting f complex substances into simpler ones. Hydrolysis is a double lecomposition in which water is the reacting agent. The process s accomplished with the aid of organic *catalysts*, called *enzymes*. A catalyzer alters the velocity of a chemical change, usually accelerating it. Enzymes occur in such minute quantities that their presence is designated in terms of activity rather than concentration. It is said that, although the exact nature of enzymatic action is uncertain, the agent is believed to be intact at the conclusion of the hydrolytic process. Actually, the enzyme is subject to deterioration, particularly under conditions involving definitely subnormal concentrations or stagnation. Enzymes frequently require activation and are extraordinarily sensitive to changes in hydrogen-ion concentration, although activity may be unaltered in the presence of chemicals (*e. g.*, fluoride, alcohol) which are inimical to life. Activity is independent of the living processes of the cells which elaborate digestive enzymes. These organic catalysts are highly specific with reference to the stereochemistry of the compounds upon which they act. The substance attacked by an enzyme is known as the *substrate*.

Digestion prepares the food for absorption which is a physicochemical process whereby the end-products of enzymatic and, unfortunately, bacterial activity reach the blood and lymph streams. The absorbed food undergoes metabolic change leading to tissue repair and maintenance (*anabolism*) or to oxidation (*catabolism*) for energy purposes. Catabolism also includes the breakdown of body tissue through wear and tear.

Chemical digestion passes through three distinct steps before provision is made for absorption. Inadequacy of these processes results in intestinal putrefaction.

SALIVARY DIGESTION.

Saliva is secreted by three pairs of glands, the submaxillary, sublingual and parotid, which are reinforced by numerous small buccal glands. The saliva is an admixture of the various secretions, its composition depending upon the predominating influence of any one pair of glands. According to Comroe the parotid saliva is a clear, limpid fluid containing little or no mucin. The sublingual secretion is viscid, being composed chiefly of mucin. The submaxillary glands produce both a serous and a mucilaginous fluid. The character of the food introduced into the mouth is largely responsible for the type of salivary response.

The secretion of saliva may be accelerated by *chemical*, *psychical*, *mechanical* and *electrical* (galvanic) stimuli. Acid, alkali or salt produces a thin watery saliva. The presence or thought of food results in a psychic secretion in a hungry subject, such saliva being rich in mucin. Salivation may be induced by inserting pebbles into the mouth, but there is little mucin in the copious flow attending mechanical stimulation unless the material is sufficiently gritty to act as an irritant to the mucous membranes. The application of an electric stimulus to the buccal surfaces produces saliva of low specific gravity.

Each salivary gland receives a double nerve supply from the central nervous system. The submaxillary and sublingual glands are supplied by nerve fibers through the facial nerve by way of the chorda tympani and the lingual branch of the fifth nerve. The fiber supplying the parotid gland was originally in the same nucleus, joining the trunk of the glossopharyngeal nerve and leaving it by the tympanic branch, passing through the tympanic plexus, the small superficial petrosal nerve, the otic ganglion and the auriculotemporalis nerve.

Mastication mixes the food with the salivary secretion. The tongue manipulates the food mass into a *bolus* which later is swallowed. Salivary digestion occurs, not in the mouth, but in the stomach until enzyme activity is halted by penetration of the acid gastric juice into the bolus.

The quantity of saliva secreted by an adult in twenty-four hours usually amounts to 1000 to 1500 cc. (extremes reported: 500 and 2000 cc.). The volume is dependent upon the type of food eaten and upon the individual's response to psychic stimuli. Since saliva contains only about 0.5 per cent solid matter, its specific gravity is low, averaging 1.005. Normal saliva is slightly acid, pH 6.8, if it is collected so as to check the loss of CO_2 to the air; otherwise, it is slightly alkaline, pH 7.2, due to the presence of carbonate and phosphate buffers. Since mastication decreases the acidity of the saliva, a definitely alkaline reaction is encountered during the course

of a meal and subsequently for approximately twenty minutes (Comroe). The acidity of saliva is increased by fermentation of food residues. Mouth washes produce only a fleeting effect upon salivary reaction.

The enzyme, or group of enzymes, found in the saliva is known as *ptyalin*. It consists of *amylase* (starch-splitting), *dextrinase* (dextrin-splitting) and possibly *maltase* (maltose-splitting). Starches, dextrins and glycogen are hydrolyzed to sugars by ptyalin which is unique in that it is secreted in the active state. Raw starch in the natural unruptured grains is practically unaffected by the salivary amylase. Maltose is usually regarded as the end-product of salivary digestion. The production of glucose is a matter of controversy.

Ptyalin is found in about equal amounts in premature and full-term infants. Children have two and a half times and adults five times as much amylolytic power as infants (Hensel, 1933). The amylase activity may be lowered in cachexia and may be increased in patients with peptic ulcers.

Marked variation in the activity of salivary amylase is noted during the day. The ingestion of food is followed by increased activity, the increment being greatest with breakfast and least with the evening meal. There is a slight decline in amylolytic power between breakfast and luncheon, and between luncheon and dinner. Coffee does not diminish the saccharogenic activity of saliva collected after the meal.

Since salivary digestion occurs in the stomach, the time interval is dependent upon the consistency of the food, the distribution of the saliva throughout the bolus and the rapidity with which hydrochloric acid inactivates the ptyalin. Under average conditions it is believed that salivary digestion continues for one-half hour, although low gastric acidity may permit activity for forty-five minutes. The presence of food in the stomach stimulates the flow of gastric juice. The increasing acidity diminishes amylolytic activity. At pH 5 there is marked inhibition of salivary enzymatic action. A trace of free hydrochloric acid (pH 3) irreversibly destroys ptyalin. The effect produced by large amounts of acid fruit juices (*e. g.*, orange, grapefruit) when ingested with a typical high-carbohydrate American breakfast is unknown.

Salivary digestion, obviously, is entirely inadequate for complete hydrolysis of carbohydrate foods. Furthermore, the prevailing universal habit of "bolting" a meal allows for little admixture of saliva with the food. The saliva can best exercise its functions if the mouth is empty when fluid is introduced. The digestive rôle of saliva is probably less vital than its other functions. Not only does it lubricate the food bolus preparatory to swallowing, but by dissolving food particles, saliva secures excitation of the taste buds and so stimulates the entire digestive process.

Since mucin combines with HCl to form a protein hydrochloride which possesses slight acidity compared to the free acid, vigorous

mastication and swallowing of large amounts of saliva may lead to reduction of gastric hyperacidity. By forced mastication and expectoration of saliva, it is possible to remove 400 to 1000 cc. of water from the body. Saliva hastens the clotting of blood, whereas gastric juice containing free HCl causes a delay and prevents the formation of an organized clot. Excessive salivation may be induced to stop bleeding of peptic ulcers.

GASTRIC DIGESTION.

The gastric mucosa is lined with numerous, slightly tortuous, deep indentations. Those glands located in the fundic region are characterized by parietal or border cells which probably elaborate hydrochloric acid. The peptic enzyme is supposedly the product of the "chief cells" which become noticeably shrunken during prolonged gastric stimulation. The cells lining the general surface of the stomach and the ducts manufacture the mucin of gastric juice.

Secretion of gastric juice is achieved through reflex nervous stimulation and local excitants, both chemical and mechanical. The reflex center for gastric secretion is located in the medulla, the efferent fibers reaching the stomach by way of the vagus nerve. Emotional states operate, presumably through the sympathetic nervous system, to inhibit the flow of gastric juice. Psychic or conditioned reflexes are occasioned by olfactory, gustatory and visual stimuli. Substances extracted from meat by boiling water and partially digested proteins induce abundant flow of gastric juice which is independent of nervous stimuli. This local chemical effect is presumably due to formation of the hormone, *gastrin*. Water will excite gastric secretion, distilled water being more effective than tap water, and tap water more than physiologic saline. The stimulation produced by coffee is attributed to purin bases, not to aromatic constituents. A warm decoction of maté leaves (100 cc., 10 per cent) increases the acidity of gastric juice. Ingestion of appetizers and alcoholic beverages before a meal apparently leads to chemical irritation with subsequent augmentation of gastric flow. Oil of peppermint is said to suppress gastric secretion. The presence of most natural protein, fat and carbohydrate foods in the stomach exerts little effect on gastric flow except where pressure upon the stomach walls is appreciated. The fluid intake with a meal is, therefore, of some consequence.

The total amount of gastric juice produced in twenty-four hours is 2 to 3 liters, approximately 700 cc. of juice being required for an ordinary meal. In the resting stomach the average volume (as obtained with a Rehfuss or Twiss tube) varies from 20 to 100 cc. and is designated as residuum or fasting contents. Gastric juice is a slightly viscid fluid varying in specific gravity from 1.001 to 1.010. The outstanding feature of gastric juice is its comparatively high degree of acidity. Although the hydrochloric acid as produced may reach 0.6 per cent, admixture with other fluids diminishes it to 0.2 per cent or less. For adults, pH 1.2 represents extreme

gastric acidity, 1.4 high acidity, 1.6 to 1.8 normal acidity, 2 to 2.4 low acidity and 3 or higher anacidity. In achylia the pH may reach 7. The secretion of HCl in infants is usually incomplete for the first six months. Normal infants on a diet of human milk show an average pH of 3.75, on cow's milk 4.75 to 5.1.

The functions of HCl in the stomach include formation of acid meta-protein which is more readily attacked by gastric protease than is native protein; activation of the gastric enzymes; production of the acid medium required for peptic activity; destruction of the vast majority of bacteria ingested with the food (little antiseptic action is secured with concentrations less than 0.1 per cent HCl); and inversion of cane sugar to a slight extent.

The most important of the gastric enzymes is the proteolytic agent, *pepsin*. The pepsin does not originate as such in the gastric cells, but is formed from its precursor, *pepsinogen*. This mother substance, or *zymogen*, is activated by the hydrochloric acid. Pepsin is a protease attacking native proteins and hydrolyzing them to proteoses and peptones with consequent increase in solubility. A negligible amount of amino-acids may be set free. The chief function of pepsin is to initiate protein digestion. It is active in the pH range 1 to 3 with an optimum at 1.7 to 2; at pH 4 the activity of pepsin practically ceases. An acidity of pH 1.7 is approximately that of 0.02 N HCl.

Two other enzymes occur in the stomach: *rennin* and *gastric lipase*. Like pepsin, rennin requires activation by hydrochloric acid. The function of this enzyme is to prepare milk for digestion by coagulating casein, its characteristic protein. The activity of rennin begins at pH 5, reaches a maximum at pH 6 and is destroyed beyond pH 7. The presence of calcium-ion is requisite for this reaction. It is difficult to determine whether rennin is a separate enzyme or merely another manifestation of peptic activity. Only a trace of lipase occurs in gastric juice; it differs from pancreatic lipase. Since emulsion of fats is not encountered in acid solution, there is little digestion of fat in the stomach. Fat of egg-yolk and milk which is already emulsified may undergo some hydrolysis.

Since the time of the earliest investigators, the question has arisen why the pepsin of the stomach does not digest the stomach wall, which in itself is protein material. The present answer to this question is that there exists an anti-peptic enzyme in the cells of the gastric mucosa which inhibits the action of the pepsin, thereby protecting each individual cell of the stomach wall. This same anti-enzyme is found in the cells of intestinal worms, such as the Ascaris lumbricoides. This principle may be extracted by grinding the parasite. A drop of this extract added to a solution of egg-white and pepsin retards digestion indefinitely.

The physical character of the food (*bolus*) after entering the stomach is now changed to a semi-fluid mass (*chyme*) which is capable of being discharged through the pyloric orifice into the duodenum. Chyme is forced intermittently in small amounts into

the intestines so that alkalinization promptly occurs. The mechanism whereby the pyloric sphincter is controlled is still a matter of conjecture. Movement of fluid or semi-fluid from the stomach to the duodenum or the reverse (regurgitation is normal during the interdigestive cycles) undoubtedly is a result of simultaneous adjustment of intragastric and intraduodenal pressure, muscle stimulation being secured either chemically or through the nervous system.

INTESTINAL DIGESTION.

In the duodenum the acid chyme encounters three digestive secretions: pancreatic juice, succus entericus and bile. Although bile is not, strictly interpreted, a digestive juice, it is requisite for intestinal digestion.

Pancreatic Juice.—The external secretion of the pancreas is a colorless, odorless, faintly opalescent, strongly alkaline fluid which foams readily. Its specific gravity is approximately 1.007 with a water content of 98.7 per cent. The daily average secretion of pancreatic juice is about 650 cc. Its function is neutralization and digestion of the acid chyme.

The chief enzymes are *trypsin* (protease), *amylopsin* (amylase) and *steapsin* (lipase). There is possibly some rennin, erepsin (peptide-splitting), maltase, lactase and invertase. The reaction at which optimum enzymatic efficiency is secured has been placed by various investigators at pH values from 6.8 to 8.2.

Pancreatic protease is secreted as a zymogen, *trypsinogen*, which is activated by *enterokinase*, an enzyme-like substance found in the intestinal juice. Calcium salts are thought to accelerate tryptic digestion. Although trypsin can attack the original protein molecule, hydrolysis is particularly rapid if digestion has been initiated by pepsin. Erepsin aids in completion of the process.

Hydrolysis of the Protein Molecule.

TRYPSIN	Native protein (as it occurs naturally)	
	↓	
	Cooked protein (derived protein)	
	↓	
	Acid metaprotein (formed in stomach)	PEPSIN
	↓	
	Proteoses (primary and secondary)	
	↓	
	Peptones	
	↓	
	Polypeptides (protein characteristics begin to disappear)	EREPSIN
	↓	
	Amino-acids (end-products of protein digestion)	

Pancreatic amylase is very energetic in converting starch to dextrin, whereas salivary amylase has a stronger dextrin-to-maltose-splitting power. The pancreatic enzyme probably does not hydrolyze appreciable amounts of maltose to glucose.

Pancreatic lipase is an ester- and fat-splitting enzyme. It hydrolyzes fat into its constituent fatty acids and glycerol as follows:

$$\underset{\text{Stearin}}{C_3H_5(C_{17}H_{35}COO)_3} + 3\,H_2O \rightarrow \underset{\text{Glycerol}}{C_3H_5(OH)_3} + \underset{\text{Stearic acid}}{3\,C_{17}H_{35}COOH}$$

Bile accelerates and possibly activates steapsin. In an alkaline medium the fatty acids are converted into soluble sodium salts which are known as soaps. Both bile and soaps emulsify neutral fat, facilitating complete digestion and absorption. In the absence of bile very little fat is digested. Such fat coats proteins and carbohydrates thereby preventing the action of the water-soluble enzymes.

The secretion of pancreatic juice is not entirely due to a nervous reflex, but is dependent upon stimulation secured by a hormone. The intestinal mucosa appears to form a substance (*prosecretin*) which is converted into *secretin* by the acid chyme. On absorption, this hormone is carried by the blood to the pancreatic cells, thereby exciting a flow of enzymatic juice. The pancreatic fluid reaches the intestines through the duct of Wirsung which opens into the duodenum at the ampulla of Vater. Bile is transported from the gall-blader into the intestine through this same opening, which is controlled by the sphincter of Oddi.

Succus Entericus.—The intestinal juice is a very alkaline, albuminous fluid elaborated by Brunner's glands. Its first function is to render the acid chyme alkaline which destroys the peptic enzyme; its second is to activate trypsinogen. The succus entericus contains enzymes which hydrolyze specific disaccharides. These are named from the substrate: *maltase*, *lactase* and *sucrase* or *invertase*. Additionally, there is a *nuclease* or group of nucleases which split nucleic acids into their component parts. Hydrolysis of nucleic acids, found in the nuclei of all cells, releases carbohydrate (usually glucose), orthophosphoric acid, purins (*e. g.*, adenine, guanine) and pyrimidines (*e. g.*, thymine, cytosine, uracil).

Bile.—The bile is a viscous fluid with a typical, bitter taste and a characteristic odor. It varies in color from a light yellow to a dark green. The specific gravity of the transparent hepatic bile is about 1.010, that of the turbid bladder bile approximately 1.040. According to Jones, hepatic bile varies in pH from 7.4 to 8.5 and gall-bladder bile from pH 5.4 to 6.9, although it is commonly believed that the pH of bile ranges from 8 to 11. It is claimed that the volume of bile amounts to 500 to 1000 cc. *per diem*. It has been estimated that 15 grams of bile are produced per kilogram of body weight per day.

Hepatic bile contains 2.8 to 3 per cent solids, composed chiefly of pigments, bile salts and cholesterol. The color of bile is due to bilirubin (yellowish-brown) and to biliverdin (green). Bilirubin is an acid existing in bile as the sodium, ammonium and calcium salts. The bile salts constitute a mixture, the composition of which has not been well established either in health or in disease. The chief salts are sodium glycocholate and taurocholate. The rôle played by these substances is not thoroughly understood. It is assumed that they function in the digestion and absorption of fats. The bile acids lower surface tension, hence favoring emulsification.

Lipids, particularly cholesterol, which are not soluble in an aqueous medium, dissolve in the presence of bile salts.

Gall-bladder bile varies in its content of solids from 10–20 g. per 100 cc. According to Rous and McMaster, the gall-bladder concentrates pigment more than ten times. There is some evidence that the ephithelia of the gall-bladder can absorb fat in a manner comparable with intestinal absorption. Water, however, is probably the main substance absorbed, the function of the gall-bladder being storage and concentration of the bile. There is little or no indication that the gall-bladder secretes a specific fluid.

Although bile is secreted continuously by the liver, it passes into the intestines only at intervals. Fats, meat extracts, proteoses and peptones cause a copious flow of bile. A cholagogue effect is also produced by the bile acids. Diminished excretion is encountered in starvation.

RÉSUMÉ OF ENZYMATIC DIGESTION.

For ready reference the appended schema is introduced in order to present the relationships of the various nutritive food elements and the respective enzymes by which they are attacked. It is to be noted that the physical body contains two complete sets of digestive mechanisms. This fact should prove of paramount importance when instituting artificial feeding.

TABLE 1.—**Digestive Enzymes.** (Mattice)*

Substrate.	Site of digestion.	Digestive juice.	Enzymes.	Effect of enzyme.
Carbohydrates	Mouth	Saliva	Ptyalin	Soluble starch → maltose
	Small intestine	Pancreatic	Amylopsin	Starch → maltose
		Succus entericus	Maltase	Maltose → glucose
			Invertase	Sucrose → glucose + fructose
			Lactase	Lactose → glucose + galactose
Proteins	Stomach	Gastric	Pepsin	Proteins → peptones
			Rennin	Casein → insoluble paracasein
	Small intestine	Pancreatic	Trypsin	Proteins → amino acids
		Succus entericus	Erepsin	Peptones → amino acids
Fats	Stomach	Gastric	Lipase	Slight hydrolysis of emulsified fats
	Small intestine	Pancreatic (bile)	Steapsin	Fats → glycerol + fatty acids

*Chemical Procedures for Clinical Laboratories.

ABSORPTION.

The object of digestion is to disintegrate complex substances, many of them colloids, into simple crystalloids which are capable of diffusion through the intestinal wall into blood and lymph channels whereby they may be transported to the tissues. Undigested or unabsorbed material is propelled to the colon where it acquires fecal characteristics and mingles with additional excretions.

Site of Absorption.—Neither food nor fluid passes through the epithelium of the oral cavity, pharynx, or esophagus. The stomach secretes rather than absorbs water. The gastric mucosa is permeable to alcohol, glucose and amino-acids. It is claimed that condiments, such as mustard, increase the permeability of the stomach wall (Bodansky). The greatest absorption of digested food occurs in the lower part of the duodenum and the upper part of the jejunum.

Substances Absorbed.—The intestinal mucosa forms a selective absorbing surface. Solubility is a prerequisite for diffusion, but solubility is no guarantee of absorption. Intestinal permeability is remarkably "one-sided." *Water* is absorbed regardless of whether the intestinal contents are hypo-, iso- or hypertonic.

The end-products of *carbohydrate* digestion include several monosaccharides among which glucose predominates. Soluble polysaccharides, being colloidal, do not penetrate the intestinal wall, but the crystalline disaccharides may, at times, enter the blood stream. Lymph shares the increase in sugar concentration noted in blood during absorption of carbohydrate. During the process of absorption, the various sugars probably undergo alteration in their molecular configuration with production of the reactive or physiologic form of glucose which alone may be utilized metabolically. Since the liver extracts glucose from the blood for replenishing its glycogen stores, the sugar content of the portal blood exceeds that in the systemic circulation.

Amino-acids constitute the end-product of simple *protein* hydrolysis and reach both the blood and lymph streams. Although di- and tripeptides probably are transported across the intestinal membranes, higher members of the series normally do not enter the body. Where intestinal permeability is altered, permitting specific proteins, proteoses, or peptones to penetrate the capillaries, severe systemic reactions ensue. Only minute amounts are required for a pronounced effect.

The prosthetic groups in conjugated proteins (*e. g.*, nucleic acid in nucleoprotein) undergo changes but vaguely understood and need not be treated here.

It is generally accepted that fat is hydrolyzed to its constituents before absorption and immediately resynthesized thereafter. Neutral fat is collected as *chyle* in the lacteals and drained into the blood stream through lymphatic channels. Blood serum, therefore, is turbid following absorption of fat. Leukocytes acquire considerable fat from the intestinal mucosa. Fatty acids occur in the blood bound to glycerol, cholesterol and phosphoric acid (that is, as lecithin).

Excretory Residue.—Intestinal contents at the ileocecal valve have the same consistency as chyme. Fecal characteristics are developed in the colon. Feces are composed of intestinal secretions and excretions, bacteria, cellular detritus and food residues. Material secreted into an isolated loop of intestines has a composition similar to feces from normal intestines through which food is passing.

On a normal mixed diet, food residues do not constitute the bulk of excreta.

Cellulose-containing foods are not completely digested in the alimentary tract. Consequently, they yield a larger fecal output than does a concentrated diet. Since a bulky food is not easily chymified, more digestive juice is required. On an average mixed diet, the adult excretes 100 to 150 grams per day, the total solids being 20 to 40 grams. On a vegetable diet, as much as 350 grams (solids 75 grams) may be anticipated.

The pH of the jejunum is 4.0 to 7.6, ileum 5.4 to 8.0 and colon 4.4 to 7.4 (Mann and Bollman). The normal fecal reaction of adults on a mixed diet varies from pH 7.0 to 7.5. Extremes of diet are required to shift the pH appreciably (*e. g.*, a rachitogenic diet consistently elevates the fecal pH). Ordinarily the dietary factor manifests itself chiefly by affecting the motility of the colon. A quart of milk or 35 to 50 grams of lactose may lower the fecal pH and increase the rate of evacuation. Laxatives lead to the excretion of soft, acid stools regardless of the reaction of the cathartic agent.

Unless administered in excessive quantity, soluble carbohydrates do not normally reach the lower intestinal tract in amounts exceeding 50 mg. per gram of dried feces. Volatile fatty acids produced by intestinal bacteria acting on residues of digestible carbohydrates stimulate the activity of the colon. Indigestible carbohydrate (cellulose and pentosans) occurring in vegetable foods have been considered the most important factor in producing regular bowel action. Carbohydrates affect motility by increasing the bulk and by the definite laxative behavior of acetic, butyric and lactic acids (Olmsted *et al.*, 1935).

INTESTINAL PUTREFACTION.

The bacterial population progressively increases from the pylorus to the anus, even in the healthiest subject. In the small intestine, however, the number of bacteria is insignificant compared to the quantity in the colon. Alvarez estimated that the normal individual excretes thirty-three million million bacteria in twenty-four hours. One milligram of feces averages 4000 million bacteria. Normally about one-third of the dry substance of the stool is bacteria.

Two different types of chemical change are initiated by these bacteria: fermentation and putrefaction. *Fermentation*, in its simplest interpretation, includes those reactions affecting the carbohydrates which ultimately result in the production of alcohol and carbon dioxide. *Putrefaction* may be defined as those changes involving proteins which lead to detachment of toxic fragments or molecular disintegration at points other than those attacked by digestive ferments.

Carbohydrates may undergo changes in the intestines leading to the release of gas (carbon dioxide, hydrogen and methane). The

ormation of acetic, propionic, lactic and butyric acids increases the motility of the colon, hence their production is frequently encouraged. Oxalic acid is an undesirable, though common, derivative of carbohydrate disintegration in the intestines. Excessive amounts of hydrochloric acid in the stomach free oxalic acid from its insoluble salts in vegetable foods followed by increased uptake by the blood. Defective secretion of hydrochloric acid results in augmented decomposition of carbohydrates in the colon with formation of oxalic acid.

Fat may be subjected to some hydrolytic destruction by bacteria, the so-called butyric acid fermentation. Abundance of fecal fat may be accompanied by an acrid odor.

Undigested and unabsorbed foods are attacked by the bacterial flora of the intestines. Digestive juices themselves are sometimes decomposed by microörganisms. In fact, some of the worst cases of intestinal putrefaction ever encountered have been associated with prolonged fasting in which loss of muscle tone in the intestinal wall and insufficient excretory bulk are important factors. Absorption of toxic protein derivatives over a period of time is generally credited with producing general irritability, malaise, insomnia, loss of appetite, nausea and melancholia. It is difficult to comprehend how absorption can occur from dry fecal masses. Intestinal pressure may be responsible for the symptoms attributed to long-continued absorption of chemical agents.

In the decomposition of amino-acids two distinct paths of destruction are possible. Decarboxylation (removal of CO_2 from the acid group) leaves an amine, sometimes designated as a ptomaine. Some well-known examples are *histamine*, *tryamine* (the active principle of ergot), also *putrescine* and *cadaverine*. Despite popular opinion these amines are not toxic in the intestines and it is incorrect to speak of ptomaine poisoning. The violent seizures of vomiting, diarrhea, low blood-pressure, rapid and feeble pulse, shallow respiration, cold clammy perspiration, complete prostration and shock are due to other toxins than the ptomaines.

The second type of putrefactive process involves removal of the amino group with formation of ammonia. The residual acids are so much less toxic than the amines that 5 to 10 grams of many of them may be ingested without causing noticeable symptoms. Perhaps the best known is benzoic acid which normally is found in the urine to the extent of 0.4 to 0.7 gram every twenty-four hours. It is not excreted as benzoic acid, but rather as a conjugated product with glycine, that is, as hippuric acid. Fragments broken off from the deaminized acids include indol and skatol from tryptophan, phenol and cresol from tyrosine, mercaptans (sulfur alcohols) and hydrogen sulfide from cystine.

The chief detoxicating process is conjugation. Oxidation and reduction may also occur. The most frequently encountered example of conjugation is the conversion of indol to indoxyl followed by union with sulfuric acid to form (as the potassium salt) urinary indican. Various investigators regard renal

excretion of 4 to 20 mg. of indican per day as normal. Skatol or methylindol is less toxic than indol; it is not excreted as a sulfate. The daily urinary output of skatol is normally less than 10 mg. Glycuronic acid (derived from glucose) and sulfuric acid are both used for combination with hydroxyl and phenolic compounds. The liver may employ acetylation (introduction of the $CH_3.CO$ group by means of acetic acid) for detoxicating amino compounds. Unfortunately there are no satisfactory laboratory tests for quantitative measurement of intestinal putrefaction.

The subject of intestinal putrefaction has received a great deal of attention by the layman and clinician, but in many instances too much emphasis is placed on the clinical picture without sufficient chemical substantiation. According to the theory of Metchnikoff, a large percentage of human illness may be traced to intestinal putrefaction. Certain advertisers, therefore, proclaim that all of this illness can readily be prevented by the use of various kinds of lactic-acid-forming milks and cultures. Fortunately for us, the body is able to take care of the major portion of these putrefactive products in its own chemical defense laboratory. The first line of defense is the intestinal mucosa itself which, like the skin, is designed to protect the body against chemical and biologic invasion. Toxins which evade the intestinal barriers are carried by the portal blood to the liver which is the best-equipped detoxicating organ of the body. Deleterious chemical agents which reach the systemic circulation are withdrawn by the kidneys and held in that organ until excreted.

Prevention of intestinal putrefaction, however, is of major importance in maintaining full health. Factors which promote bacterial growth and so increase the tendency to intestinal putrefaction include overabundance of protein foods, insufficient gastric acidity, inadequate secretion of digestive juices, faulty absorption and diminished motility of the colon. The rôle played by the carbohydrates and their derivatives has already been considered. Generous amounts of water with meals diminish bacterial activity. An adequate flow of bile decreases putrefaction, since it not only possesses laxative properties but also facilitates digestion, preventing accumulation of food residues.

It is the province of the clinician to provide patients with diets which have been ascertained to induce colonic health through avoidance of intestinal putrefaction. This cannot be achieved without due regard for the multitudinous factors involved. In particular, faddist diets must be eschewed and a regimen developed along safe and sane physiologic and chemical lanes.

SECTION III.

VITAMIN FACTORS IN THE DIET.

JOSEPH BERG, M. D.

Introduction.—In previous editions this section was concerned hiefly with a plea for wider recognition of the importance of low-rade, long-continued, partial vitamin deficiencies as affecting the ealth of the individual and as a public health problem. The resentation of these views was at that time a matter of importance or, while the fully developed avitaminoses were well recognized, he idea of chronic partial deficiency as a clinical condition had not een generally accepted. Many conservative authorities main-ained that the importance of the vitamins was exaggerated, that eficiencies were unlikely on the ordinary diets of the American eople, and that there was no evidence for the need of vitamin applies greater than those required to prevent the recognized eficiency diseases.

The problem was there presented as follows:

To the clinician, the public health worker, and the student of nutrition, he possible significance of such chronic partial deficiencies overshadows in nportance the high-grade avitaminoses. The clinician may seldom see a ase of xerophthalmia, beri-beri, scurvy or pellagra, but he is greatly oncerned to know whether his patients are suffering from lesser degrees f inadequacy of necessary dietary constituents. The public health worker even more concerned to know what constitutes an adequate diet. Work-g with the school child, with families on unemployment relief, or studying he nutrition of the entire population of a district, he can only judge the dequacy of the diet by the incidence of frank malnutrition or outspoken eficiency disease; what he would like to know is whether lesser degrees f inadequacy are to be held responsible for increased morbidity, lowered esistance, or poorer chances for future health. Sound and well-controlled vidence for such nutritional deficiencies is not easily obtained. The labora-ory investigator has necessarily centered his attention first upon the roblems presented by clear-cut, high-grade deficiency. The effects of artial deficiencies are obscure and often difficult to demonstrate objec-vely. Clinical study is equally difficult, since human material seldom eets the exacting conditions of a satisfactory nutrition experiment and is not often possible to work for long periods of time with simplified diets f constant composition.

Vitamin research in the future will undoubtedly be directed increasingly oward the study of the chronic partial avitaminoses, and the more exact easurement of human requirements and of the vitamin content of com-on foods. Sufficient knowledge has already been gathered to demonstrate hat partial deficiencies are of decided clinical importance and often respon-ble for chronic functional disturbances and general depression of health nd resistance to disease, but relatively little is known concerning their pecific clinical and pathologic effects. There is evidence that such defi-encies are far from uncommon on ordinary diets, and it is certain that hey are frequent on therapeutic diets, which seldom are constructed with n eye to nutritional completeness. The physician, in treating one disorder, as thus often been responsible for the development of another.

Since the foregoing was written there has been extensive study of optimal vitamin requirements and the nature of partial deficiency syndromes. The contributions of recent years have supplied a mass of data of various kinds which enable us to approach more closely the answers to these questions. The development of quantitative methods of assay applicable to foods, body tissues and excreta, and the availability of pure preparations of the vitamin substances have made possible studies of vitamin levels in blood and tissues, and of retention and excretion in relation to intake, with corresponding deductions as to the maximum amounts which the body can utilize. More extensive and more accurate assays of foodstuffs have made it possible to assess the adequacy of diets and the effects of high and low intakes, while large-scale diet surveys are providing evidence of the extent of suboptimal nutrition.

These advances in knowledge have resulted in general acceptance of the thesis that optimal vitamin requirements are likely to be much higher than the protective level against deficiency disease, and that chronic subclinical deficiency is an important factor in determining the level of individual and public health. The Council of Foods of the American Medical Association, for example, now accepts as established the fact that suboptimal intake of thiamin is frequent, that this is primarily attributable to the removal of the vitamin-bearing portion of the grains and cereals in milling, and that the general health of the population would be promoted by increasing the intake of this factor. Much work remains to be done, but with present investigations oriented toward that goal we may anticipate rapid progress in the direction of more accurate knowledge of the optimal requirement of each factor and the amount present in foods.

Outstanding among the advances of recent years are the chemical identification and synthesis of a number of the vitamins. Among those now commercially available in pure form are carotene, thiamin, riboflavin, pyridoxin, nicotinic and ascorbic acids, tocopherol, vitamin K and folic acid.

Experimental work with these purified factors has combined with their commercial exploitation to create a new set of problems. Scientist, physician and layman tend more and more to think of the vitamins as pharmaceutical preparations or as chemical entities, unrelated to one another or to the diet. The physician, consequently, administers the tablet or ampoule of concentrate instead of studying the patient's food intake and correcting the diet. The efforts of investigators to identify the specific deficiency effects of each of the known factors and the publicity given to their findings have helped to direct attention away from the fact that in human malnutrition single deficiencies are rare or actually non-existent, and to obscure the part contributed by factors not yet recognized.

In clinical work it is to be remembered that the vitamins frequently occur in groups, that there is evidence of synergisms among them, and that no combination of the known factors in purified

rm can replace the natural vitamin-rich foods. A diet can be onsidered adequate only if care is taken to include sufficient mounts of those foods which have been established as good sources f the recognized vitamins and of accessory factors in general. The purified preparations of single factors should be reserved for hose situations in which they are specifically indicated.

LOSS OF VITAMINS IN THE COMMON DIET.

It is still widely believed that the common, "well-balanced," nixed diet, particularly if it contains fruits, green vegetables and alads, is adequately provided with the necessary vitamins. Those who hold this opinion fail to take into consideration the unavoidble loss of vitamins incurred in the preparation and cooking of oods, and the large part which devitaminized foods necessarily lay in the modern diet.

Whether of animal or vegetable origin, the natural food of an nimal in the wild state is eaten uncooked, whole, and living or ecently killed. Modern man gets but a small part of his food in his state, for the development of civilized society has brought with t ever lengthening intervals of time and space between the production of food and its consumption. Natural, fresh foods are in eneral the more perishable and the more expensive; preservation nd storage are economic necessities, and the cheaper foods must upply the needs of the masses. Furthermore, taste, custom and ommercial propaganda tend to divert our food habits even further rom the animal biologic need.

The greatest part of the world's food is supplied by the cereals, out the processes of milling and cooking deprive most of our cereal oods of their vitamins, especially vitamin B, of which they are he chief natural source. Fruits and vegetables for shipment and storage are picked before ripening, or they are dehydrated, cooked, r otherwise preserved. In modern methods of canning the exclusion f air tends to prevent vitamin loss, but dehydration, storage in air, nd home methods of cooking and canning destroy vitamin C. The asteurization of milk is also destructive to this vitamin. The lanching of vegetables and the discarding of the green outer leaves n favor of the white inner leaves reduces the amount of both itamin A and vitamin C. In meats, our taste tends to reject the iscera, rich in accessory factors and vitamins, in favor of skeletal nuscle, relatively devoid of these substances. And finally, an ncreasingly large part of the modern diet is occupied by refined oods completely lacking in vitamins; these include white flour, ugar, lard, oil, farina, syrups, and most candies and sweets. Such oods displace from the diet the natural vitamin-containing foods which should normally supply energy and tissue-building materials. Thus selection, taste and custom combine with storage, preservation, efining and cooking to deplete the diet of its normal vitamin conent. Probably the greatest single factor is the high degree to which the modern diet makes use of foods prepared from devita-

minized flour; the ubiquitous corner bakery stands as a symbol of corrupted dietary habits.

Langstroth found in his investigation of 501 American dietaries that bread accounted for 16 per cent of the calories of the average diet and butter for 17 per cent, while the low-vitamin foods as a whole furnished 79 per cent of the total calories, the high-vitamin foods only 12 per cent. He found an apparent inverse correlation between the percentage of high-vitamin foods in his patients' diets and the incidence of what he calls the "degenerative" diseases, including chronic circulatory disease, chronic arthritis, chronic gastro-intestinal disease, migraine and diabetes. His treatment included a "corrective" diet in which 70 per cent of the calories were furnished by high-vitamin foods, and he was able to note a considerable degree of improvement in many of his patients.

FACTORS CONDITIONING A RELATIVE VITAMIN DEFICIENCY.

A relative vitamin deficiency may be due to a low-vitamin intake, to defective absorption and utilization, or to an increased requirement. It may be of value to summarize here the conditions which are most frequently responsible for vitamin deficiency.

Low intake, due to—
- Inadequate available supplies, as on shipboard, in prisons, asylums and orphanages, on exploring expeditions, in the feeding of armies, in remote or sometimes less remote rural districts and in famine areas.
- Devitaminization of foods by storage, preserving methods, refining, milling, cooking and preparation for the table.
- Vagaries of taste, preference and habit, including the insane, the psychoneurotic, the eccentric, the food cultists and those who believe too literally commercial food propaganda.
- Illness, by way of low total food intake or restricted therapeutic diets.
- Anorexia.
- Alcoholism with low food intake.
- Poverty.
- Ignorance of what constitutes an adequate diet, our own ignorance as well as the laity's.

Poor absorption and utilization, due to—
- Gastro-intestinal diseases and disorders, including anacidity or achylia, cancer, diarrhea, obstructions, biliary, pancreatic and intestinal fistulas, etc., also, possibly, excessive use of mineral oil.

Increased requirement, due to—
- Depleted reserves due to previous inadequate diet.
- Pregnancy.
- Lactation.
- The growing period.
- Fevers and infections.
- Increased metabolism, caused by hyperthyroidism or increased muscular work.
- A high total food intake.

A NORMAL, COMPLETE DIET

The normal diet, complete in all necessary factors, is a simple one, though we cannot yet lay down definite minimal requirements

RECOMMENDED DIETARY ALLOWANCES, REVISED 1948
(AMOUNTS PER DAY)
Food and Nutrition Board, National Research Council

	Calories[1]	Protein grams	Calcium grams	Iron mg.	Vitamin A I. U.[2]	Thiamine mg.[3]	Riboflavin mg.[3]	Niacin (Nicotinic acid) mg.[3]	Ascorbic acid mg.	Vitamin D I. U.
Man (154 lb., 70 kg.)										
Sedentary	2400	70	1.0	12[4]	5000	1.2	1.8	12	75	[5]
Physically active	3000	70	1.0	12[4]	5000	1.5	1.8	15	75	[5]
with heavy work	4500	70	1.0	12[4]	5000	1.8	1.8	18	75	[5]
Woman (123 lb., 56 kg.)										
Sedentary	2000	60	1.0	12	5000	1.1	1.5	10	70	[5]
Moderately active	2400	60	1.0	12	5000	1.2	1.5	12	70	[5]
Very active	3000	60	1.0	12	5000	1.5	1.5	15	70	[5]
Pregnancy (latter half)	2400[6]	85	1.5	15	6000	1.5	2.5	15	100	400
Lactation	3000	100	2.0	15	8000	1.5	3.0	15	150	400
Children up to 12 yrs.[7]										
Under 1 yr.[8]	110/2.2 lb. (1 kg.)	3.5/2.2 lb. (1 kg.)	1.0	6	1500	0.4	0.6	4	30	400
1–3 yrs. (27 lb., 12 kg.)	1200	40	1.0	7	2000	0.6	0.9	6	35	400
4–6 yrs. (42 lb., 19 kg.)	1600	50	1.0	8	2500	0.8	1.2	8	50	400
7–9 yrs. (58 lb., 26 kg.)	2000	60	1.0	10	3500	1.0	1.5	10	60	400
10–12 yrs. (78 lb., 35 kg.)	2500	70	1.2	12	4500	1.2	1.8	12	75	400
Children over 12 yrs.[7]										
Girls, 13–15 yrs. (108 lb., 49 kg.)	2600	80	1.3	15	5000	1.3	2.0	13	80	400
16–20 yrs. (122 lb., 55 kg.)	2400	75	1.0	15	5000	1.2	1.8	12	80	400
Boys, 13–15 yrs. (108 lb., 49 kg.)	3200	85	1.4	15	5000	1.5	2.0	15	90	400
16–20 yrs. (141 lb., 64 kg.)	3800	100	1.4	15	6000	1.7	2.5	17	100	400

in terms of specific foods. Such a diet should not provide too large a proportion of calories or bulk in the form of devitaminized foods; the smaller the proportion of white flour, refined cereals, sugar, lard, oil, syrups and processed, preserved and cooked foods, the less danger of vitamin shortage. It should contain liberal amounts of meat, eggs, milk or cheese, fresh fruits, green vegetables, and salads, and butter fat; the amount of starchy vegetables, bread and other cereal products should depend upon the energy requirement, and *these foods should not be allowed to displace the necessary protein, mineral, and vitamin-containing foods.* Such a diet should be adequate as to protein, mineral salts and most of the vitamins, but the inevitable refining and cooking of its cereal foods may leave it suboptimal as regards B_1 and probably other factors in the B group. The beneficial effect which frequently follows the use of vitamin B supplements supports this view, as do the dietary surveys and studies already mentioned.

It is also questionable whether such a diet furnishes an optimal amount of vitamin D. The advisability of vitamin D supplements in the common diet will be discussed later; we may say here that every individual who does not receive liberal amounts of solar or artificial radiation would probably benefit from such supplementing.

Daily Vitamin Requirements.—Despite an enormous amount of investigation, precise vitamin requirements under a variety of conditions cannot be stated. Even when the protective dosage against gross deficiency disease is known with some accuracy, it is no sure guide to the hypothetical "optimal" requirement—the maximum amount by which the body can use with benefit. The yardstick by which nutritionists measure desirable intake of the various food factors is shown in part on page 47 and more fully on pages 600-601.

THE HIGH-VITAMIN DIET.

The vitamins are not only curative for their specific deficiency diseases; *they are also necessary to maintain normal health and resistance to other diseases.* The *vis medicatrix naturæ* depends upon the maintenance of optimal nutritional conditions, and it should be the aim of the physician to fortify natural resistance as much as possible by ensuring an adequate intake of all necessary factors.

The *high-vitamin diet* has wide application in the treatment of disease, in some conditions for its specific therapeutic effect, in others as a therapeutic adjuvant for increasing resistance and maintaining nutrition. As far as present knowledge goes, an increased vitamin need appears to be present, or an increased intake beneficial, in the following conditions:

In prolonged or wasting illness (tuberculosis, typhoid, chronic infections, anemias, and blood dyscrasias).

In "run-down" conditions, malnutrition, and lowered resistance.

Under conditions involving the growth, development or repair of tissues (pregnancy, lactation, infancy and childhood, convalescence).

In chronic gastro-intestinal disorders (constipation, colitis, diar-

hea, gastric atony, hypochlorhydria, visceroptosis, ulcer, sprue, ellagra).

When the total metabolism or total food intake is increased (high-aloric diet, increased muscular work, hyperthyroidism, fever).

In restricted therapeutic diets (diabetic, obesity, low-residue, ulcer, etogenic diets).

In some skin diseases.

The following list indicates the *richest food sources of the vitamins*, or use in high-vitamin diets. It is not intended to indicate all he foods in which the various vitamins are found but only those which constitute the best sources of each.

itamin A. Butter fat, cod-liver and other fish oils, egg-yolk, green leafy vegetables, prunes, apricots, carrots.
Thiamin (vitamin B_1). Wheat-germ, yeast, whole cereals, nuts, legumes.
Riboflavin (vitamin B_2 or G). Liver, lean meats, milk, vegetables, fruits, eggs, whole cereals, wheat-germ, yeast.
Nicotinic Acid. Yeast, liver, lean meats, fish, milk, green vegetables, wheat-germ.
Ascorbic Acid (Vitamin C). Fruits and vegetables, especially the citrus fruits, new cabbage, peppers, and tomatoes.
Vitamin D. Fish-liver oils, egg-yolk.
Vitamin E. Fresh vegetables, wheat-germ and vegetable oils.
Vitamin K. Hog-liver oil, spinach, kale, cabbage, cauliflower, tomatoes, egg-yolk.

A convenient basic scheme for a high-vitamin diet (to be modified to meet individual needs) follows:

Breakfast:
Well-ripened, fresh fruit, preferably citrus
2 eggs
1 to 2 heaping T. wheat-germ with milk, cream or fruit juice
1 slice whole wheat bread or toast, buttered
1 glass of milk

Lunch:
Tomato or fruit juice
Meat, fish, liver, or cheese
Cooked vegetable or raw vegetable salad
1 slice whole wheat bread, buttered
Ripe, fresh fruit, with or without cream
1 glass of milk

Dinner:
Meat soup
Meat, fish, liver, eggs, or cheese
Cooked green vegetables with butter
Uncooked vegetable salad
1 slice whole wheat bread, buttered
Ripe, fresh fruit, with or without cream
1 glass of milk.

The total caloric intake may be augmented, if desired, by the addition of cereals and starchy vegetables, and by increasing the intake of butter and cream. The diet, as given, furnishes about 150 grams of carbohydrate; in the diabetic diet the bread and milk may be reduced in amount if less carbohydrate is desired, and the caloric intake made up by additional butter, cream and cheese. A vita-

min D supplement (cod-liver oil, haliver oil, viosterol, etc.) should be used, unless adequate solar or artificial radiation is obtained.

VITAMIN ADEQUACY IN THERAPEUTIC DIETS.

Therapeutic diets have too often been constructed with the sole aim of eliminating foods considered harmful, without sufficient thought to the inclusion of all necessary factors. Schroeder and Wittman studied the vitamin content of various therapeutic diets as prescribed for ulcer, gastritis, dyspepsia, pyelitis, nephritis, etc. They found most of these diets low in vitamin C, many deficient in thiamin and riboflavin and fewer deficient in A and D. The general principles laid down for insuring adequate vitamin supply will apply to most of these special diets; only those in which the vitamin intake is particularly likely to be deficient will be specifically treated

Diabetic and Obesity Diets.—In both these diets the restriction of starchy foods, including whole cereals, legumes, nuts, and milk, markedly reduces the available supply of vitamin B_1 and some other members of the B complex. There is evidence that the constipation, indigestion, asthenia, and lowered resistance so often occurring may be due to the low B-complex intake. Supplementary high vitamin-B foods, such as wheat-germ, should therefore be employed, particularly as the restriction in both diets is of long duration.

The basic diet in both instances should contain generous amounts of protein (meat, eggs, milk or cheese), at least 3 portions of fresh fruit and liberal amounts of green vegetables, salads and butter. The amount of starchy vegetables, bread and other cereal products permitted depends upon carbohydrate tolerance and energy requirement. Milk, cream, butter and cheese are nutritionally valuable and so far as possible should be given preference over the starchy foods as sources of energy. Butter-fat should not be excluded from the obesity diet, but other fats are not required. When the fat intake is restricted, one of the A and D concentrates should be included. Eggs and wheat-germ will supply the other fat-soluble factors.

The High-caloric Diet.—This useful measure in the treatment of tuberculosis, malnutrition, hyperthyroidism, typhoid and chronic wasting diseases, is not always well designed to serve its purpose. The run-down patient who needs the high-caloric diet is often suffering from anorexia or from diminished digestive capacity and tolerance; if not at the start, he is likely to be after a few days' attempted overfeeding. The physician therefore must increase calories without increasing bulk. He meets the situation by concentrating on refined starchy foods, sugars and fats, eliminating to a great extent the green vegetables, fruits and other bulky foods of relatively low-caloric value. Such a diet is likely to be low in vitamin C; furthermore, a high total food intake with increased amounts of carbohydrate involve an additional requirement for vitamin B_1 which is lacking in refined carbohydrates and must be

upplied otherwise. The high-caloric diet is better assimilated and etter utilized when its vitamin-B_1 content is high. It should herefore include fresh tomato juice or fruit juice for vitamin C, nd yeast or wheat-germ to supply the vitamin-B complex; the utter and cream ordinarily given furnish sufficient vitamin A.

Hyperthyroidism.—Himwich, Goldfarb, and Cowgill have called ttention to the increased vitamin B requirement in experimental yperthyroidism and the ability of vitamin B to prevent loss of eight in this condition when given in sufficient amount. Furthernore, Fischer considers B deficiency to be a contributing factor n the development of goiter, and reports that administration of itamin B produces histologic changes in the gland resembling hose produced by feeding iodized salt. As in the high-caloric diet, he use of supplementary B sources, such as cereal germ or yeast, s advisable.

Wendt has reported a reduction in the vitamin-A content of the lood serum in hyperthyroidism, and increase in weight and lowerng of the basal metabolic rate in patients with this disease when iven large amounts of vitamin A. Abelin and other authors have ound an antagonistic action between vitamin A and thyroxin in xperimental animals.

The Low-residue Diet.—The low-residue diet, as usually prescribed, s likely to be low in vitamins by reason of its high content of refined arbohydrates—white flour, cane sugar, lactose, cornstarch, etc.—nd its low content of fresh uncooked fruits and vegetables. The liet should therefore include fresh fruit juices and tomato juice, and should be supplemented by bran-free cereal germ or dried yeast, and cod-liver oil.

The Ulcer Diet.—The ulcer diet is generally similar to the lowesidue diet, but in the earlier stages it may be undesirable to use he acid fruit juices or tomato juice. During this period, therefore, t is necessary to depend upon raw fresh milk for the vitamin C equirement. But since the C content of even raw milk is not high, and since vitamin C deficiency has been found to increase the incilence of gastric ulcer in experimental animals, the use of ascorbic cid preparations is advisable as a supplement. As soon as possible he fruit juices or tomato juice should be added; they may be neuralized if desired, or buffered by mixture with milk. Well-ripened anana may also be employed as a non-acid source of vitamin C. Experimental evidence (Dalldorf; Sure and Thatcher) showing a orrelation between vitamin B_1 deficiency and susceptibility to lcer formation makes advisable the addition of bran-free cereal germ in order to ensure adequacy of this vitamin. Vitamin D hould be supplied by cod-liver oil or a similar supplement.

The Ketogenic Diet.—The ketogenic diet, because of its marked estriction of carbohydrate-containing foods, is low in the waterolubile vitamin-B complex and vitamin C. Wilder has described 2 cases of pellagra developing on this diet and has emphasized the need for supplementing it with foods rich in these vitamins. Tomato

juice, ascorbic acid preparations, and brewer's yeast or cereal germ may be employed for this purpose. Wilder also recommends the addition of 2 or 3 grams of calcium lactate daily to correct the calcium deficiency in this diet.

THE VITAMINS AND THE VITAMIN DEFICIENCIES.

Nomenclature.—The substances called collectively the vitamins differ widely in chemical nature and in physiologic function. They have the one common characteristic of being non-mineral substances required in relatively small amounts for the maintenance of normal structure and function of the body tissues. Their designation by letters dates back to the time when these unidentified dietary factors could be described only as fat-soluble A, water-soluble B, and the like. This notation is being replaced by appropriate chemical terms, as carotene and thiamin; these, in time, will supplant the alphabetic terminology. Names based on deficiency symptoms, as antiscorbutic, antirachitic vitamin, etc., with their implications of disease and cure, are undesirable for normal food substances. Since successive stages of separation and identification have left behind many terms no longer in use, a glossary is appended (p. 834).

VITAMIN A.

Physical and Chemical Properties.—Vitamin A is a primary alcohol, $C_{20}H_{29}OH$, derived from carotene and the related carotinoid pigments of plants. Practically colorless, it is soluble in oils and fats, insoluble in water. It is unaffected by dilute acids and alkalies. Vitamin A is fairly stable to heat in the absence of oxygen, but is destroyed by oxidation, especially at high temperatures. Oxidation is slow at room temperature. The vitamin is inactivated by exposure to ultra-violet irradiation and by rancidity of its fatty vehicle.

The carotinoid pigments vary in their vitamin-A values, the most active being beta-carotene. This is a crystallizable, oil-soluble orange-red pigment which, like vitamin A, is oxidized and destroyed by air, especially at high temperatures. Chlorophyll appears to have a protective action against this destruction. Carotene is readily converted into vitamin A by the normal liver; thus under normal conditions availability of carotene in the diet is equivalent to availability of vitamin A. In general, the carotinoids are the plant sources of vitamin A, while both carotene and vitamin A are found in animal sources, such as butter-fat, egg-yolk, liver and fish-liver oil.

Another substance having Vitamin A activity is known, designated as Vitamin A_2. It is found chiefly in the livers of fresh water fish and differs from Vitamin A_1 in that its structure contains one additional double bond and two less hydrogen atoms. Both these substances may properly be referred to as Vitamin A, although Vitamin A_2 is apparently less active physiologically than Vitamin A_1 When we speak simply of Vitamin A, we are referring to Vitamin A_1, the better known of these two substances.

Absorption and Storage.—Vitamin A occurs in natural oils and fats as an ester. Commercial preparations may contain the free alcohol which apparently is esterified before absorption by way of the lymphatics. The vitamin is also transported and stored as a fatty acid ester. The hydrocarbon carotene cannot enter into such combination and thus is less absorbable. Bile is essential for utilization of carotene, a bile acid derivative probably being formed. The presence of bile is advantageous for the absorption of vitamin A but not altogether necessary. Since they are fat-soluble, both carotene and vitamin A are poorly absorbed from the intestine whenever fat digestion and absorption are defective. Absorption of vitamin A reaches a maximum three to five hours after administration whereas carotene requires six to seven hours.

The use of mineral oil laxatives, in which carotene and vitamin A are soluble, tends to interfere with their absorption. Dutcher *et al.* (1934) reported that liquid petrolatum inhibited the absorption of carotene but not vitamin A. Anderson (1939) found up to 25 per cent of the ingested vitamin in the excreta. Since vitamin A was eliminated in very small amounts or not at all in control experiments using a purgative, it was concluded that the vitamin loss with mineral oil was not attributable to acceleration in intestinal evacuation. Anderson advises against the prolonged use of mineral oil except in conjunction with a diet rich in vitamin A; the oil should not be given near meals. It is generally assumed that diarrhea may lead to loss of much of the ingested vitamin A.

It is interesting to note, however, that Hoffman and Dyniewicz (1945) reported that the administration of alumina gel in therapeutic doses did not appreciably affect the absorption of Vitamin A.

Carotene is less readily absorbed than vitamin A. Apparently the molecule is not split in the intestinal tract. Even after five to six hours of existence in the liver, there is little conversion into active vitamin A. The process, therefore, requires time.

The liver is the chief storage depot of vitamin A and may contain a large reserve of this factor. The amount present in the liver of the new-born child is small and not appreciably affected by dietary measures during pregnancy. With advancing age the liver reserve tends to build up; Bessey and Wolbach (1939) found 200 to 400 I.U. per gram in the well-nourished adult, or 10 to 20 mg. per gram of liver. Crimm studied the vitamin-A content of the liver and found wide variations. Children averaged 80 I.U. per gram. (For the first two to three years of life the amount of vitamin A found in the liver is small.) The average value in adult subjects who had died suddenly was 331 I.U. per gram. Four cases of pulmonary tuberculosis on high-vitamin diets averaged 523 I.U. One case which had received prolonged intensive vitamin-A therapy showed 3359 I.U. per gram.

The length of time required for depletion of the liver is presumably a matter of weeks or months. Fevers and infections reduce the vitamin A contained in the tissues. This depletion appears to be

especially rapid in infants since their reserves are small. There is evidence that the conversion of carotene into vitamin A may be deficient in diseases of the liver, and the storage of both may similarly be impaired when this organ is damaged. Histologic studies also suggest that vitamin A in the Kupffer cells may not be generally available due to block in the transmission mechanism (Popper, 1940).

Oral administration of vitamin A results in rapid repletion of liver stores under normal conditions. Other routes are less effective since esterification is essential to utilization and the intestinal wall is particularly effective in this regard. In the early stages of deficiency the oral route gives best results but in advanced deficiency epithelial changes in the alimentary tract may affect absorption.

Numerous investigators have found evidence that both hyperthyroidism and hypothyroidism tend to reduce the vitamin-A reserves. Abelin, Wendt, and others have reported an antagonism between thyroxin and vitamin A, administration of the vitamin tending to reduce the metabolic rate and loss of weight in experimental hyperthyroidism produced by feeding thyroxin, and to have a similar effect on patients with Graves' disease. Likewise, administration of thyroxin diminished the reserves of carotene and vitamin A. The tissue levels of vitamin A are low in myxedema and cretinism, and in experimental animals deprived of the thyroid gland there is decreased ability to convert carotene into vitamin A (Fasold and Heidemann, 1933-1934). Low vitamin-A concentrations have been reported in blood serum in Paget's disease.

Physiologic Action and Deficiency Effects.—Deficiency of vitamin A retards growth and development in experimental animals. While deficiency probably tends to have a similar effect in children, there is no reason to suppose that vitamin A is a specific growth factor or that the retardation is different in nature from that which occurs when any other essential nutritive factor is inadequately supplied. The growth of bone ceases with establishment of vitamin-A deficiency, but not so the nervous system. Neurologic lesions result from this unequal growth (Wolbach and Bessey, 1940) due to mechanical damage to brain, spinal cord and nerve roots.

Deficiency of vitamin A seems to exert its effects chiefly upon the epithelial tissues. The normal mucosa of the respiratory and urinary tracts and of the eyes is transformed into stratified, cornified epithelium, and with this change there is lowered resistance to infection. The increased susceptibility to respiratory, urinary and possibly other infections which occurs in vitamin-A deficiency seems to be due to impairment of the normal epithelial barrier to invading organisms. It can be overcome by an adequate supply of the vitamin and in this sense vitamin A is "anti-infective," but there is no evidence that the use of vitamin A supplements can increase protection against infections when the epithelial surfaces are unimpaired by vitamin-A deficiency. The amount of vitamin A present in well-balanced diets appears adequate to maintain this type of resistance at its maximum.

In the eye, marked deficiency of vitamin A affects the conjunctiva nd cornea, producing the condition known as xerophthalmia. In e skin a condition of xerosis with diminished secretion may occur, nd in adolescents and adults this may appear as a follicular or apular dermatosis (phrynoderma). Marked degrees of vitamin-A eficiency may produce similar metaplastic changes in the epithe-um of the urinary tract, including the bladder, renal pelvis and ossibly the tubules. Whether or not these changes predispose to alculus formation is a question which is still undecided, but indi-iduals susceptible to renal lithiasis should be assured a high intake f vitamin A. It has been reported that the tendency to form stones increased when A deficiency is accompanied by defects of calcium nd phosphorus metabolism. It is obvious also that an adequate itamin-A intake should be assured to patients suffering from chronic r recurrent infections of the urinary tract.

It is now well established that the photosensitive substance resent in the retinal end-organs which enables them to react to light s a pigment formed by the combination of vitamin A with a protein. This substance, rhodopsin or visual purple, is the photo-active lement in the rods. It is thought that a related pigment may be arried by the cones. When this pigment is exposed to light it is leached and chemically altered, apparently with the liberation of itamin A. Wald found 0.2 to 0.3 gamma of vitamin A in the light-dapted retina and only traces in the dark-adapted retina. The naintenance of an optimal amount of visual purple in the rods epends upon the availability of vitamin A. Even slight degrees f A deficiency appear to affect retinal function which is manifest y diminished ability to see clearly in low intensities of illumina-ion (elevated light threshold), and also slowness in recovering isual acuity after the retina has been bleached by exposure to a right light. The first effect is responsible for the clinical condition nown as hemeralopia or night blindness, but even persons unaware f inability to see well in relative darkness may be much slower han normal in recovering vision after exposure to a bright light, uch as the glare of an automobile headlight.

Detection of Vitamin-A Deficiency.—Slow recovery from bleaching nd defective adaptation to darkness are the most delicate indices f vitamin-A deficiency at present available. In recent years they ave been made the basis of tests for clinical vitamin-A deficiency nd a number of photometers have been developed for testing these unctions. The principle employed is that of exposing the eyes to definite bright light for a fixed period of time to bleach the retina nd then measuring the amount of illumination required to dis-inguish a test object at intervals during the period of recovery or etermining the time required for recovery of vision at an arbitrary egree of reduced illumination. In the presence of deficiency, ecovery is both slow and incomplete. While the test is undoubt-dly valuable, there has been a tendency to overestimate its relia-ility and specificity. To be reliable an exacting technic must e followed and all other possible causes of diminished visual func-

tion excluded. These may include various diseases of the eye, visual defects, riboflavin deficiency, and the effect of neurotoxins such as lead. Thomson and his co-workers (1939) made an extensive study of the test and concluded from their results that neither the rate of dark-adaptation nor the light threshold of the fully dark-adapted eye has a close correlation with the vitamin-A intake in the diet. It follows that impairment of these functions as shown by the photometric test can be taken to signify vitamin-A deficiency only when subsequent administration of therapeutic doses of the vitamin results in definite and marked improvement in the test.

Pett (1940) has observed unaccountably short recovery times (indicating high blood levels of vitamin A) the day following the ingestion of alcohol. Clausen previously had found alcohol to mobilize this vitamin from tissue stores in blood tests upon dogs.

Jeans and Zentmire performed photometric tests on 231 children from a hospital service in Iowa. They found 45 definitely subnormal; 21 of these were treated with a satisfactory diet plus cod-liver oil and all regained normal adaptation in an average period of twelve days. They concluded that partial degrees of A deficiency are of frequent occurrence.

Wald found visual sensitivity to decrease within twenty-four hours on a vitamin-deficient diet. It could be cured, however, in so short a time as twenty minutes with a single large dose of vitamin A or carotene.

Wise and Schettler (1938) reported that eye-strain was relieved and the efficiency of color matching increased 75 per cent by the ingestion of carotene in oil. The Westinghouse Electrical Manufacturing Company provided carotene in oil for its employees who were photometrically deficient. During a twenty-five-months' experiment (1939) there was marked reduction in rejects due to off-color parts and the results were taken as evidence of relief of eye-strain under factory conditions. It may be concluded that persons whose occupation requires a high degree of visual acuity, of dark-adaptation, or of exposure to brilliant light should be assured an abundant supply of vitamin A.

A chemical method for determination of plasma Vitamin A consists in the production of a deep blue color when Vitamin A or Carotene react with a solution of antimony trichloride in chloroform (Carr-Price Reaction). The result obtained from such determination represents the sum total of both carotenoids and Vitamin A in the plasma. Carotenoids must obviously be separately determined at the same time in order that we may know how much Vitamin A is actually present. A high plasma Vitamin A level may be taken to indicate good Vitamin A nutrition provided one remembers that the plasma Vitamin A level is elevated in those conditions in which blood lipids are increased. Plasma Vitamin A

eterminations are probably of more value for survey purposes han in individual cases.

The use of a Vitamin A tolerance test has been described by Ruch, 3runsting and Osterberg (1946) in certain cases of dermatologic lisorders. They determined the concentration of Vitamin A in he serum, after the patient had fasted for twelve hours and at our and six hours respectively, after the oral administration of massive dose of the Vitamin. In cases of keratosis follicularis nd congenital dyskeratosis, the test disclosed an abnormally flat urve.

Carotene Content of Blood Plasma.—With the Connor method 1928) the normal has been regarded as varying from "negative" o 0.1 mg. per cent except for persons on a high-pigment diet. n measuring the yellow color of the serum both the carotene of egetables and the xanthophyll of eggs are encountered. Since the olor equivalence is not the same, the results are frequently exoressed in "units" which are arbitrary. Connor regards the empirical potassium dichromate standard (0.02 per cent) as corresponding to 0.1 mg. per cent carotene or 100 "units" whereas Clausen and McCoord (1938) compute this standard at 0.137 and).146 mg. respectively for carotene and xanthophyll. As a consequence, the Clausen values are much higher than the Connor igures. The former reports normal values at 75 to 100 "units" vith a decrease to 50 "units" in the course of a week on diets free rom pigmented vegetables, eggs, butter and cream.

Carotinemia.—Under certain little understood conditions, the olood plasma may show an increase in carotinoids sufficient to stain ertain tissues. In the skin the yellow color is particularly marked on the soles and the palms. The degree of pigmentation is not necessarily proportional to the plasma concentration but when this ises to levels exceeding 200 "units" xanthosis cutis is often maniest (Clausen). The scleræ and urine are not abnormally colored as n jaundice.

Excessive ingestion of certain of the pigmented vegetables is often he determining factor in carotinemia, but inability to dispose of mall quantities of carotene may be more important. Reduction of lietary pigments may lower the serum carotene rapidly, although he skin discoloration may persist for some time thereafter. If the ondition develops on a normal intake of carotinoids, response is ess prompt following a reduced intake.

Carotinemia is not infrequent in diabetes, where a high vegetable ntake may or may not play a part in its development. It is not oroportional to the severity of the diabetes (although contrary opinion is held) nor is it influenced by insulin or dietary control of he blood sugar level. Its significance is not clear. It has been

reported that plasma concentrations of carotene and vitamin A tend to follow the level of plasma lipids; this may explain the elevation found so frequently in diabetes.

There is evidence that some diabetics are unable to convert carotene into vitamin A. Poor light adaptation is common and does not respond to carotene therapy whereas the fish-liver oils may normalize the condition promptly.

The following tentative conclusions were reached by the Committee on Nutritional Problems (W. H. Eddy, Chairman, 1939):

Blood carotene is lower in concentration and less variable than vitamin A.

There is no constant ratio between carotene and vitamin A; a low level of active vitamin does not necessarily imply a diminished carotene content and *vice versa*.

Ingestion of fat is followed by more immediate response in vitamin A than in carotene.

Single determinations are not reliable for establishing vitamin A saturation.

Requirement.—The **International Unit**, identical with the U.S.P. unit, is equivalent to 0.0006 mg. of pure β-carotene. This unit also defines vitamin-A activity. Cod-liver oil, for example, rated at 600 U.S.P. units of vitamin A per gram contains the equivalent of 0.36 mg. of β-carotene per gram.

The Nutrition Board of the National Research Council recommends a daily allowance of 5,000 I. U. for adults of average weight regardless of their type of employment. In pregnancy, however, 6,000 units is recommended and 8,000 during lactation. Growing children should receive from 2,000 to 4,500 units daily, while for those under one year of age, 1,500 units are probably sufficient.

In fevers, acute infections and chronic or wasting diseases, ample amounts should be supplied, probably exceeding 10,000 units daily. In hyperthyroidism and hypothyroidism similar levels of intake are advisable. No harm can come from liberal supplements and it is better to insure an adequate supply when conditions suggest an increased need, as in the presence of diarrhea. Brown (1940) has suggested that the therapeutic dose be 20,000 to 50,000 units daily *per os*.

It has been recommended that vitamin A or carotene be supplemented with bile salts when biliary obstruction may interfere with absorption, as in catarrhal jaundice. In liver disease, deficiency of this vitamin does not respond to the usual amounts in the diet (Jeghers, 1937) and warrants the use of large doses parenterally.

Sources and Administration.—Carotene and xanthophyll are responsible for much of the yellow color in plants. Green pigments may mask carotinoids; chlorophyll itself provides no vitamin A. In general, provitamin A is present in proportion to the depth of color in plant foods. Yellow vegetables, therefore, are superior to the corresponding white varieties insofar as vitamin A is concerned

ikewise, dried green peas are a better source than the yellow ariety. Carrots, sweet potatoes, and pumpkin rate highest among he yellow vegetables, but yellow turnips are a poor source of vitamin A. Rutabagas contain considerably more of this vitamin but nuch less than sweet potatoes. Broccoli, kale, and parsley are ighest among the green vegetables; turnip greens are a rich source. Bleached vegetables (lettuce, cabbage, asparagus and celery) are elatively poor, as compared with the green forms. Cauliflower self is low in the vitamin although its leaves are rich. It should be tressed that vitamin A occurs in plants only in the form of pigments apable of conversion into it.

Among animal sources, fish-liver oils rank highest; they are rich n vitamin A and relatively low in carotene. Shark-liver oil is outtanding in its A content. Salmon-liver oil also has been utilized n preparing potent vitamin-A concentrates. Peanut and sesame oil ack vitamin A. Egg-yolk and butter-fat (milk, cream, butter, heese) are excellent sources; their color is of limited value in udging their vitamin-A potency since both the pigment carotene nd the colorless vitamin occur in variable proportions. One quart f milk contains sufficient vitamin A on the average to meet the daily ninimum vitamin requirement of an adult. Cow's milk contains nly one-tenth to one-fourth the vitamin-A content of human milk.

For supplementing the diet, when this is indicated, fish-liver oils re preferable to purified carotene or purified vitamin-A preparaions. Cod-liver oil has stood the test of time and experience as n effective source of fat-soluble accessory factors. While the more ecent introduction of haliver oil and other fish oils has furnished ources richer in vitamin A than cod-liver oil, with a consequently maller daily dose, it should not be taken for granted that these reparations are nutritionally equivalent to the larger doses of codver oil. These oils contain numerous non-saponifiable lipids and terols which may be metabolically useful and we are not justified n assuming that their value as dietary supplements is due solely to heir content of vitamin A and vitamin D. Wherever possible, herefore, cod-liver oil should be looked upon as the supplement of hoice. According to Yudkin 1 or 2 teaspoons daily of standard od-liver oil will protect a child against vitamin-A deficiency.

THE VITAMIN B COMPLEX.

Early attempts to identify the beri-beri-preventive factor showed hat it could be extracted from its food sources by water and dilute lcohol. These crude extracts were found, in experimental animals, ot only to prevent polyneuritis but also to prevent growth retardaion and dermatitis produced by certain defective diets. The ietary factor thus identified was termed *water-soluble B* and was t first presumed to be a single substance.

Further study revealed that more than one factor was involved, nd recent years have seen the identification of numerous compoents of the vitamin-B complex. It is probable that still further

factors remain to be separated and identified. Those at present recognized are: Thiamin, riboflavin, niacin, pyridoxine, pantothenic acid, biotin, folic acid, choline, inositol and para-aminobenzoic acid. Of these, thiamin, riboflavin, nicotinic acid, vitamin B_6 or pyridoxin, and pantothenic acid have been established as necessary in human nutrition and their deficiency effects studied.

Although the members of the B complex are more or less unrelated chemically, their consideration as a group is justified since they not only tend to occur together in foodstuffs but also are closely related in function. During the years when the members of the vitamin-B complex were being studied from the nutritional point of view, other investigators were elucidating the enzyme systems concerned in cellular respiration. The first important identification was that of *flavin*, a substance discovered to occur in foods containing riboflavin, and subsequently proved to be responsible for its activity. Further work on the respiratory enzymes and greater fractionation of the B complex have shown that those factors so far identified all belong in the series of these enzymes. Thiamin, riboflavin, nicotinamide, and vitamin B_6 are essential components in the chain of enzymes which enable foodstuffs to be broken down step by step within the cell. It is possible that the other members of the B complex will be found to be similarly related.

The identification, synthesis and study of the components of the B complex has written new chapters in the physiology of nutrition. So much has been learned about thiamin, riboflavin, nicotinic acid and, lately, vitamin B_6 that we now think of them as separate entities rather than as a group. From the clinical point of view this is probably unfortunate. Their close relationship in nature means that a dietary deficiency of one is very likely to be accompanied by deficiency of the others, and their functional relationship suggests that it may be wiser to think of the complex as a unit. It should also be kept in mind that the incomplete state of our knowledge concerning the other components of the complex does not warrant our dismissing them as nutritionally unimportant. Eddy and Dimick have shown that combinations of the known members of the B complex fail in experimental animals to produce the normal growth and development obtained with the entire B complex as found in rice bran filtrate. What this means in human nutritional problems is that *foods which are rich sources of the entire complex are preferable to concentrates or extracts*, and that *crude concentrates are more desirable than the purified or synthesized factors* as dietary supplements. Furthermore, Elvehjem has pointed out the necessity for fat in the diet if the maximum response to the water-soluble B complex is to be obtained.

Thiamin.

Physical and Chemical Properties.—Thiamin chloride is a colorless, crystalline substance, $C_{12}H_{17}ON_4SCl$, characterized by a pleasant odor, marked solubility in water, slight solubility in alcohol

id insolubility in oils. Since it is readily adsorbed, clarification liquid foods by filtration through fuller's earth, charcoal, and e like may result in appreciable loss of this vitamin. It is decomsed by sulfites; thus the sulfuring of fruit lowers its thiamin content. Thiamin is destroyed at high temperatures; this destruction is stened by an alkaline medium and retarded by an acid one. hen soda is used in cooking, the combination of heat and alkali is rticularly destructive to thiamin. Since it is highly soluble in ater, it is readily extracted when fruits and vegetables are boiled, id is lost when the cooking water is discarded. The loss of activity ie to cooking processes, however, is sometimes remarkably small his is attributed to the existence of the stable pyrophosphoric ester thiamin in many foods. Since whole cereals constitute an imrtant natural source of thiamin, it is worth noting that the cooking these cereals does not seriously lessen their B_1 potency. Neither there much loss in the baking of breads or biscuits .

According to Munsell freezing appears to preserve the vitamin ontent of foods. Thiamin, however, is more readily extracted in ie cooking of frozen foods than with untreated foods. It cannot e too strongly stressed that foods rated as good sources of thiamin the natural state may be practically valueless as served, due to ich losses.

Absorption and Storage.—Thiamin is readily absorbed from foodiffs by the normal gastro-intestinal tract, and there would seem be little justification for parenteral administration except when rge doses and rapid action are necessary, or when absorption is iterfered with by diarrhea, vomiting, or related disorders. Some inestigators, however, suggest that the parenteral route may, at times, e more effective but the question cannot be considered as settled.

Since thiamin is not as effectively stored in the body as vitamin , its reserves are much more quickly exhausted. (Rats on a iamin deficient ration suffer complete depletion of the body rerves in fourteen days.) According to Cowgill the main storage epots are the liver, heart, and kidneys. The proportionate distriution is given by Brodie and MacLeod as: liver 10, heart 9, idney 5, voluntary muscle 1, brain 0.33; blood, spleen and lungs aces.

It is necessary that the daily diet be adequate in its thiamin ontent since the reserves are not sufficient to compensate for dietary eficiency for more than a few days.

Physiologic Action and Deficiency Effects.—Thiamin functions the body as the pyrophosphate (cocarboxylase) in the metabolism carbohydrate; specifically, the metabolism of pyruvic acid. When ie tissues are deficient in this substance, the oxidation and utilizaon of carbohydrate are interfered with. The effect of thiamin deciency upon the nervous tissues may be due to their sensitiveness any deficiency in carbohydrate utilization, or to a possible toxic fect produced by the accumulation of partially oxidized carbohyrate in the form of pyruvic acid and lactic acid. The effect of defi-

ciency upon other tissues may be a direct effect of similar nature, or it may be due to impaired function of their innervation.

Clinically, deficiency of thiamin appears to affect chiefly the gastro-intestinal tract and the nervous system, and it may be regarded as established that the normal health and functioning of these tissues requires an adequate supply of this substance. It is possible that the gastro-intestinal disturbance may be secondary to primary involvement of the intrinsic nerve plexuses, but there is also evidence that loss of smooth muscle tone and degenerative changes in the mucosa may be primary effects of thiamin deficiency.

Marked vitamin B_1 deficiency results in polyneuritis (beri-beri), a disease characterized by sensory and motor disturbances, particularly of the lower extremities, myocardial weakness, muscular weakness and atrophy, and sometimes edema. *Chronic low-grade deficiency* is more obscure in its manifestations, but is now generally recognized to be of considerable clinical importance. The picture of an individual suffering from such a deficiency may include a general depression of neuromuscular tone and vigor; digestive disturbances which may take the form of subnormal appetite or digestive capacity, gastric atony, constipation, or more serious conditions, such as ulcer and colitis; lowered resistance to infections; and, perhaps less frequently, anemia and neuritis. In thiamin deficiency the neuritis is always bilateral.

Williams, Mason, Wilder and Smith have recently (1940) reported observations on experimental thiamin deficiency in a group of physically healthy women which confirm and extend the foregoing views. They found that pure thiamin deficiency failed to produce the complete clinical picture of beri-beri; in no case did they find edema, cardiac dilatation, or the typical neuritic pain. In the early stages of deficiency the chief symptoms were fatigue, anorexia and constipation. In the later stages all subjects developed marked weakness, nausea and vomiting, loss of weight, apathy and lethargy with marked reduction in the ability to perform physical work and in mental alertness, concentration and memory. They all complained of backache and soreness of the muscles, and there was usually tenderness of the calves. Other symptoms of nerve involvement were sensations of cold and heat, burning of the soles, numbness of the legs, depressed tendon reflexes, and mental depression, but these symptoms were not constant. The effect upon the circulation was shown by palpitation and dyspnea on exertion, with bradycardia at rest and tachycardia on exertion, and by lowered blood-pressure. Some patients also showed diminution in the voltage of the T-wave of the electrocardiogram and impairment in quality of the heart sounds. Muscular atony and weakness, and fatigue of the ocular muscles occurred. Photophobia and headache were also noted. Studies showed diminished gastro-intestinal motility and diminished gastric acidity in all patients. The glucose tolerance curves in three or four patients showed an increase in height and delayed return to normal, indicating impaired ability to demobilize ingested sugar. Other effects

re dizziness, headache, abdominal distention and insomnia. No
emia occurred, there was no cheilosis or reddening of the skin or
ngue, and no edema. The plasma proteins, calcium, phosphorus
d the size of the heart were unaffected. Confirmation of the cause
these symptoms was furnished by treatment with pure thiamin
loride which resulted in return to normal in all cases. It is
obable that their symptoms would have been diagnosed as neuras-
enia or chronic nervous exhaustion had the diet (polished rice,
pioca, cornstarch, sugar, white bread, butter, cottage and Amer-
an cream cheese, egg-white, cocoa, tea, and white raisins) been
known.

Conditions attributed in the literature to subacute and chronic
iamin or B complex deficiency include anorexia (Cowgill; Hoobler
al.), gastric atony (Cowgill; Rowlands), gastric ulcer (Dalldorf;
ure and Thatcher), atony of the intestine with depression of peris-
lsis, constipation, degenerative changes in the mucosa and in
uerbach's plexus (Rowlands), malnutrition (Morgan and Barry;
arks), asthenia and lowered resistance (Marks), retardation of
owth and development in the young (Hoobler; Sure; Morgan and
arry; Bloxsom), nervousness and irritability in children (Bloxsom),
iminution in learning ability (Maurer and Loh Seng Tsai), defi-
ent lactation (Sure and Smith), changes in the thyroid (Fischer),
crodynia (McClendon), cramps and pains in the lower extremities,
nd the polyneuritis of pregnancy and alcoholism.

Some of these deficiency effects are no doubt caused by multiple
eficiencies of the vitamin-B complex. It is not well understood,
or example, to what degree the gastro-intestinal disturbances are
ue to thiamin deficiency and to what extent to other factors.
linical studies have shown that many patients with digestive dis-
rders and with constipation are improved by the use of diets higher
vitamin B complex, but the use of pure thiamin as a supplement
eems to be less effective in many instances than the cruder prep-
rations containing other factors of the B complex. It is possible
at these factors supplement one another in their action and are
ore effective when given together. In spite of the large amount
work and observation which has been carried out with pure
iamin preparations, it is not yet possible to state that this factor
one affects any of the symptoms except those due to degenerative
euritis.

Clinical Estimation of Deficiency.—Since thiamin, riboflavin and
iacin are so closely related in the B vitamin complex, it has been
und feasible to determine deficiency estimations of these sub-
ances as a group and will be here so considered. The amounts
these vitamins excreted by the kidneys are related to their intake
d tissue "saturation." It is therefore possible to derive some
timate of an individual's vitamin B status by determining the
nounts of thiamin, riboflavin and niacin excreted into the urine
ter a twelve hour fasting period. It has been found that any
cess of vitamin B ingested with a meal is usually excreted within

eight hours. If, therefore, the individual is asked to fast for twelve hours and then submits a specimen of urine collected during the thirteenth hour, the quantities of thiamin, riboflavin and niacin per 100 cc. determined in this sample may be taken as a guide to the body stores of the vitamins. A person with normal vitamin B saturation will excrete in excess of 20 gammas thiamin, 50 gammas riboflavin and 400 gammas niacin per 100 cc.

It is also possible in the case of riboflavin and thiamin to perform four hour "urinary load tests". These are done by injecting a given amount of the pure material after which the amount excreted in four hours is determined. It is supposed that if an individual's tissues are poorly saturated with the substance under investigation, that more of this substance will be absorbed and retained in the body than when the opposite is the case; the less the urinary output, therefore, the greater the deficiency and visa versa.

Other methods employed in the determination of thiamin deficiency include pyruvic acid determinations, either alone or in conjunction with blood lactic acid as well as estimation of blood cocarboxylase and muscle biopsy.

Requirement.—The normal requirement of thiamin appears to be proportional to the total metabolism or total food intake rather than to body weight. Thus, the child requires more in proportion to its size than the adult. Vigorous physical activity or overfeeding increases the thiamin requirement. It is also affected by the relationship between fat and non-fat calories in the diet, increase in the proportion of fat decreasing the need of thiamin. Alcohol, like carbohydrate, increases the body's demand for vitamin B_1. Infections, fevers and other processes which stimulate oxidation correspondingly increase the vitamin requirement.

Cowgill (1935) was the pioneer in expressing mathematically the relation between caloric intake, body weight and B_1 requirement. His revised formula is:

$$\text{Thiamin need in I.U.} = 0.00426 \times \text{body wt. in kilos} \times \text{caloric intake}$$

Williams and Spies (1938) calculate the thiamin requirement on the basis of the non-fat calories of the diet. When the quotient *thiamin: non-fat calories* is less than 0.3 the diet is likely to produce beri-beri.

It must be emphasized that both of these formulas are designed to express the amount of thiamin required to prevent the development of beri-beri. They do not indicate the optimal thiamin intake.

A number of investigators have reported on the basis of animal experimentation that the lactating mother requires from 2 to 5 times the amount necessary for her own needs if she is to supply enough vitamin B_1 in her milk to meet the full requirement of her offspring. It has been found that the tissue stores of thiamin become depleted during pregnancy, the vitamin accumulating in the mammary glands and the embryo. This depletion appears to be responsible for the development of maternal beri-beri, frequent in the Orient, and has been shown to be the cause of pregnancy polyneuritis as it

ccurs in America. Numerous clinical reports have demonstrated he beneficial effect of an increased vitamin-B intake in pregnancy nd lactation, and a decreased incidence of pregnancy toxemia and euritis when vitamin-B supplements have been employed.

The vitamin-B requirement was found by Cowgill, Rosenberg nd Rogoff (1931) to be increased when the food intake was augented through vigorous exercise. Beznak and Perjes reported hat when rats were subjected to increased muscular work the drenals showed hypertrophy, but that this hypertrophy could be revented when the intake of vitamin-B complex was increased to ve times the usual daily amount. The question of increased reuirement in hyperthyroidism has been investigated by Himwich, oldfarb and Cowgill (1932). They found that the requirement as proportional to the increased metabolism and caloric intake. o quote these investigators: "The loss of weight so characteristic f hyperthyroidism is readily corrected by administration of unifferentiated vitamin B." . . . "It might be said that vitain B therapy is indicated in those conditions characterized by an ncrease in the metabolic rate." Others have studied the ability of hiamin to protect against toxic doses of thyroxin and have found hat it prevents the loss of weight otherwise seen. In personal bservation the supplementing of high-caloric diets with additional itamin B appears to promote the utilization of the diet with conequent increase in body weight.

It is evident that definite figures cannot be set for the thiamin equirement without taking into consideration the various factors hich may influence it. It is not even possible to state any definite elationship between the amount needed to prevent beri-beri and he optimum which the body can utilize. Recent studies have mphasized the marked difference between protection against berieri and optimal intake. Since the requirement for thiamin varies ith the type of diet as well as physical and physiologic activity pregnancy and lactation), it is not possible to give a single figure hich will satisfy all cases. The Food and Nutrition Board of he National Research Council recommends a daily allowance of .5 mg. for moderately active men weighing 70 kilos. The allownce for women is slightly less (1.2 mg.) but is increased in pregnancy nd lactation to 1.5 mg. For children, in proportion to age, the ange varies from 0.4 for infants up to 1.7 for children sixteen years f age. Roughly, the allowance corresponds to .5 mg. per 1000 alories of dietary intake.

The paper of Williams, Mason, Wilder and Smith supplies the est experimental evidence yet available as to thiamin requirement. As previously mentioned, it is only when the thiamin intake of their ubjects was greater than 2 mg. daily that the thiamin excretion howed a sharp rise suggesting surplus intake. Furthermore, on he basis of mental alertness, physical work performed and subective feeling of well-being, their subjects showed definite improveent when thiamin intake was increased above the 750 micrograms

furnished by their supposedly good hospital diet, and this improvement continued to increase until an intake of 2 mg. daily was reached. Since the subjects were physically healthy adult women averaging about 50 kg. in body weight, on diets furnishing approximately 2000 Calories, and living relatively sedentary lives, it may be assumed that the optimal intake is correspondingly larger for males, for persons of greater body weight, and for those engaged in active physical labor or consuming diets of higher caloric value.

Units.—Availability of pure crystalline thiamin as a reference standard makes it possible to express the thiamin content of foods in terms of milligrams or micrograms of pure substance. It is to be expected that this method of measurement will eventually displace the older **International Unit** and Sherman-Chase Unit. One milligram of thiamin hydrochloride is equivalent to 333 I.U. or 3 micrograms constitutes 1 I.U. The formerly used Sherman-Chase rat-growth unit is equivalent to approximately 0.5 I.U.

Thiamin Shortage in Ordinary Diets.—Recent years have provided increasingly reliable evidence that the average common diet in Western countries is apt to supply less than an optimal amount of B_1. The data bearing on this question are so extensive that only the outstanding facts can be mentioned. Cowgill has summarized them well. Large-scale diet surveys in America and in England show that the average diets of wage-earners furnish from 250 to 500 I.U. of thiamin daily, the higher figure being the average for the best paid groups who have the greatest expenditure for foods. It is now accepted that large numbers of people subsist on diets well below a desirable level of thiamin intake and not much above that required to prevent outspoken beri-beri. The lack of specific and recognizable signs of B_1 deficiency, apart from beri-beri, is probably responsible for our failure to recognize the prevalence of this dietary defect, but the frequency with which evident improvement in health follows a change to a higher thiamin intake affords additional proof of suboptimal levels in ordinary diets.

Numerous authorities have called attention to the low-thiamin content of our common foods and to the marked loss resulting from the degermination of cereal food products, especially of wheat flour. It remained for Baker, Wright and Drummond to estimate quantitatively the loss of thiamin from this source. They found that stone-ground whole wheat flour as produced before the advent of modern milling processes contained 1.65 I.U. of thiamin per gram, while the common white flour now contains only 0.15 unit. These investigators also studied the total flour consumption of the English population one hundred years ago and at present, and found that consumption had diminished from an amount equivalent to 21 ounces of bread daily to 11 ounces. The total daily loss of thiamin from wheat sources thus exceeded 500 I.U. Examining old diet records (including those of seamen, soldiers, prisoners, hospital inmates, and the parish poor) and contrasting them with the present, it was observed that the older diets ranged from 640

·1230 I.U. daily while the highest income groups of today were ·eiving 450 to 550 units.

It thus seems to be established that the milling of grain and anging dietary habits are responsible for a very large loss of iamin, necessitating that this be rectified by thiamin-rich supple- ents. Cowgill suggests the addition of thiamin to wheat flour d related foods, but it should not be overlooked that this vitamin not the only accessory factor lost through milling and degermina- on. Wheat embryo is also a source of riboflavin, nicotinic acid, rridoxin, and vitamin E. Its functional importance as a reservoir r the growth of the plant puts it in the category of foods rich in cessory substances (along with yeast, egg-yolk, and liver) and it not to be assumed that thiamin alone or a combination of the iown members of the B complex will restore all that is lost in ocessing. Until the matter is better understood, it would seem gical to avoid this deficiency by the use of whole grain cereal oducts or by the addition of wheat-germ itself to the diet.

When a higher thiamin intake is achieved by the use of whole heat bread, the starch consumption is correspondingly increased. he trend of modern dietary habits for persons not engaged in iysical labor has been toward lower consumption of starch and real products. Such persons, and those on low-carbohydrate diets r weight control or diabetes, cannot be expected to eat sufficient hole wheat bread to ensure a high thiamin intake. While the eneral use of whole germ flour would improve the situation, par- cularly for the lower income groups, it will still be necessary for iany to tap sources which are rich in thiamin but relatively poor starch.

Sources and Administration.—It is noteworthy that there are no itstanding sources of thiamin among common foods. Whole grain roducts, if used in sufficient quantities, would insure an adequate ipply of this factor, but it is hardly possible to obtain enough from iis source under modern conditions of food consumption. It iould be repeatedly emphasized that natural plant sources contain oth the carbohydrate fuel and the thiamin catalyst necessary for s complete oxidation. Processing of the food too often leaves ie carbohydrate behind without the attendant means of utilizing to the fullest extent.

It has been shown by Aughey and Daniel that "on a serving asis baked potatoes, including the skin, rank higher in thiamin ian cooked whole wheat or oat cereals. Even boiled potatoes, pinach, and carrots may be classed as furnishing amounts of thia- iin per serving comparable to those supplied by these cooked ereals. One slice of an all-whole-wheat bread also contains approxi- iately the same quantity of thiamin as one serving of these vege- able and cereal foods." "The whole-grain cereals and dried egumes included in every list of thiamin-rich foods furnish less of iis vitamin than is generally supposed" since they are not con- imed in the dry state. "Navy beans, taking up less water during

cooking, furnish proportionately more thiamin per serving than the cereals."

Although fruits and vegetables are hardly notable for their thiamin content, they contain sufficient to be of significance when these foods are prominent in the dietary.

The liberal use of potatoes, legumes, pork products, liver, nuts, whole grain cereals, milk, and egg-yolk should provide an adequate thiamin intake. It is to be noted that such a diet necessarily furnishes a high-carbohydrate intake. When this is contraindicated, supplementary sources of thiamin are necessary, the best of which are yeast and wheat-germ. Yeast products are extremely variable in thiamin content and should have been standardized by assay before use. Wheat-germ is less variable, but it is likewise preferable to employ standardized preparations. The ordinary amounts taken are ½ to 1 ounce daily of brewer's yeast powder or wheat-germ. Tomato or prune juice has proved to be a satisfactory vehicle for the yeast.

The advent of pure crystalline thiamin preparations on the market in convenient dosage forms has led to their widespread and indiscriminate use. These products should not be employed for the ordinary purpose of increasing the dietary content of thiamin but should be reserved for the treatment of deficiencies where very large doses are indicated and for patients unable to take the cruder preparations, or where parenteral administration is necessary.

When the body reserves are seriously depleted, as in beri-beri, doses as large as 20 to 50 mg. daily may be used by intramuscular or intravenous injection, but once the reserves are built up it is doubtful whether doses larger than 10 mg. daily have any advantage since the excess is excreted promptly. Tablets of 5 or 10 mg. may be added to the daily diet to ensure a high-vitamin intake in fevers and infections and when restricted therapeutic diets prevent the use of high-thiamin foods, but in general the crude concentrates of the vitamin-B complex are preferable for supplements in such conditions. Postoperatively it is suggested that a 20-mg. dose be given daily (orally, intravenously, or intramuscularly).

The vitamin B_1 commercially available is thiamin hydrochloride with 1 molecule of water of hydration. In aqueous solution (1 to 20) a pH of approximately 3.5 is observed. Such solutions may be sterilized without loss by heating to 120° C. for thirty minutes or more, the stability depending upon the highly acid reaction (Molitor and Sampson, 1936).

Riboflavin.

When riboflavin was identified as a growth-promoting and dermatitis-preventing factor of the vitamin-B complex, it was first designated as B_2 or G. Later separation of other factors from this portion of the complex led to confusion, B_2 or G sometimes being

ed for riboflavin and sometimes the entire group. Obviously, the emical term is preferable.

Physical and Chemical Properties.—Riboflavin is an orange-llow crystalline pigment, $C_{17}H_{20}N_4O_6$, somewhat soluble in water d dilute alcohol. It occurs both free and as a phosphate, in hich form it enters into combination with a specific protein to nstitute the yellow respiratory enzyme of Warburg. The sepa-tion of this ferment by dialysis into a protein and a flavin destroys s enzyme characteristics but does not inhibit vitamin activity. he flavins are widely distributed in the plant and animal kingdoms, it apparently they cannot be synthesized by the animal cell.

In solutions, riboflavin exhibits an intense yellow-green fluores-nce (maximum at pH 6 to 7). It is not oxidized by exposure to r but is inactivated by light, particularly by ultra-violet irradiation. Riboflavin is relatively resistant to heat, except in the presence alkalies. It is not affected by dilute acids but if kept at room mperature in an alkaline medium, it gradually loses its potency. asmuch as temperatures of 125° C. for several hours are needed r inactivation, ordinary cooking is not apt to destroy the vitamin.

Absorption and Storage.—Being water-soluble, riboflavin is read-y absorbed from the gastro-intestinal tract unless abnormal func-on exists. Increased liberality of intake results in measurably gmented concentrations of this vitamin in body tissues generally Carlsson and Sherman) but capacity for storage is limited. The ver is the chief depot with the kidneys and heart muscle next in der. Emmerie cited by Hogan reports that excretion exceeds gestion onlow diets and lags behind on a high intake. Processes volving both storage and tissue depletion do not appear to be pid. The stored vitamin may not be used for current needs hen exogenous riboflavin fails nor may the tuisses promptly absorb etary riboflavin. Under stress, it would appear that the flavin conserved more efficiently by the body than is thiamin. On adequate diet, riboflavin can be detected in the urine, which is ot the case in deflnite deficiency.

Physiologic Action and Deficiency Effects.—Riboflavin is a com-onent of one of the essential intracellular respiratory enzymes oncerned in the oxidation of carbohydrate. The growth-promot-g properties inherent in the vitamin-B complex have been ascribed riboflavin, but growth undoubtedly involves more than this ctor.

According to Sherman and Campbell (1939) riboflavin shares ith calcium and vitamin A the credit for the chemical improve-ent in an already normal condition of nutrition. The calcium take appears to influence the retention of iron. Riboflavin may e instrumental in the utilization of iron for hemoglobin formation. may also determine the biologic value of the dietary protein.

Because of its close association with other factors of the B complex, otably nicotinic acid, it has been difficult to determine the clinical

picture of pure riboflavin deficiency in humans. Deficiency of the flavin is responsible for some of the manifestations of the pellagra syndrome. "A specific type of glossitis can often be recognized before other signs of riboflavin deficiency are present. The tongue is clean, the papillæ flattened or mushroom-shaped rather than atrophic, the color is definitely purplish-red or magenta as compared with the scarlet of nicotinic acid deficiency. Frequently the development of this type of glossitis can be observed in pellagrins whose red atrophic tongues have become normal in appearance under nicotinic acid therapy but whose diet has remained deficient in riboflavin."

The signs of ariboflavinosis so far described are the aforementioned glossitis, nasolabial seborrhea, greasy scales behind the ears, a salty crust like "urea frost" on the bridge of the nose and forehead which refuses to be brushed off (Jolliffe), a typical cheilosis, and keratitis. The cheilosis involves "reddened, then shiny, denuded lips with maceration and fissuring in the angles of the mouth." The quotations are from Kruse, Sydenstricker, Sebrell and Cleckley, who describe the ocular manifestations of riboflavin deficiency. Where dimness of vision and partial blindness result from such deficiency, biophotometric measurements will be affected. Riboflavin and vitamin A exert a synergistic effect in improving ocular disturbances. Vascularization of the cornea, observed under expert examination with the slit-lamp, may be the only symptom seen in riboflavin deficiency.

In experimentally produced riboflavin deficiency fatty infiltration of the liver is a common finding and, incidentally, has been observed also in cases of pellagra coming to autopsy.

Deficiency symptoms are seen clinically in the presence of markedly inadequate diets as in pellagra, chronic alcoholism, and poorly-balanced, long-continued therapeutic diets. Not infrequently persons of professional standing exhibit definite riboflavin deficiency. There is increasing evidence that ariboflavinosis is the most widely distributed of the vitamin deficiencies. If acute deficiency has been relieved by riboflavin and then the therapy discontinued, the symptoms may return in eight to twenty days on an unaltered diet.

Requirement.—The requirement for riboflavin depends, like thiamin, upon many variable factors such as the type of diet, physiologic and physical activity. According to the recommended allowances of the National Research Council, a daily intake of 1.8 mg. for a moderately active man receiving 3,000 calories is ample. In the latter half of pregnancy and during lactation, the recommended allowances are respectively 2.5 and 3 mg.

For laboratory determination of riboflavin deficiency refer to this topic under thiamin.

Sources and Administration. Milk and milk products constitute an important source of riboflavin in the diet. Pasteurization, evaporation, drying, etc., do not seriously lessen the riboflavin value.

Sherman has called attention to the fact that riboflavin appears

be formed primarily in the green leaves of actively growing plants nd to remain there in higher concentration than elsewhere in the ant. Kale, turnip greens, etc., are excellent sources of this vitain. Rose and Phipard found green peas and lima beans to contain bout 300 gamma per 100 grams. Lantz reported that cooked nto beans were a good source of riboflavin and that the method cooking had little effect on this factor; there was no appreciable ss in discarded soaking water.

Some fruits and most root vegetables possess fair amounts of avin. Grapes, lemons, grapefruit and oranges contain little of this tamin. Carrots are equal to milk, meat, and the poorer leafy egetables. Cereal products are low in the vitamin although whole ains contain small quantities. Wheat-germ is rated as a good urce, varying from 450 to 1200 gamma per 100 grams.

Yeast and liver are the outstanding sources of riboflavin. Liver as approximately ten times the riboflavin content of muscle. ccording to György fish muscle is poor in this vitamin. Meat nd meat products are an important source of riboflavin, glandular rgans being particularly rich. From the data of Michelsen, aisman, and Elvehjem the minimum daily requirement of this tamin can be met by 12 to 15 grams of dry liver or 50 to 60 grams the fresh material, the food being fried before ingestion. Aproximately 450 grams of fresh fried pork loin would be needed provide a similar amount of riboflavin.

The abundance of good sources of riboflavin makes it evident at deficiency is not likely to occur in normal well-varied diets. he use of green vegetables, meat, eggs, and milk products is suffient to insure an adequate intake.

For the treatment of acute and severe deficiencies, purified prepaations of riboflavin are available for oral or parenteral use. Six illigrams daily are ample for subsidence of symptoms in a few days Sebrell). Lack of ready solubility hampers oral administration, 5 mg. being required by mouth for the same effect as 5 mg. intrauscularly. Under such dosage, pain and lacrimation in keratitis sappear within twenty-four hours. In two weeks, corneal opacities ay have vanished; certainly they should be gone in a month and sion restored to normal except in the case of long-standing lesions.

Nicotinic Acid (Niacin).

In 1911 Funk assigned the name "vitamine" to a crystalline subance which would prevent and cure beri-beri. Analysis showed at nicotinic acid amide was one of its components, but since this bstance did not possess antineuritic potency no further attention as paid to it. .

In 1924, Goldberger and Tanner postulated the presence of a bstance in foodstuffs which would prevent and cure human pelgra. This was designated as the P-P (pellagra-preventive) factor. 1928, Goldberger and Wheeler demonstrated that the disease in gs known as *black tongue* was analogous to human pellagra in its

response to preventive and curative diets. In 1937-1938 it was established that nicotinic acid or its amide was the pellagra-preventive vitamin. It should be recognized, however, that the pellagrin generally presents symptoms attributable to lack of nicotinic acid, thiamin, riboflavin, and possibly pyridoxin.

Physical and Chemical Properties.—Nicotinic acid or 2-pyridine carboxylic acid, $C_5H_4N.COOH$, crystallizes as colorless needles which are soluble in alcohol and ether but only slightly so in water. The acid is readily soluble in alkali carbonate solutions. It is fairly resistant to heat.

Physiologic Action and Deficiency Effects.—Nicotinamide is an essential component of the series of intracellular respiratory enzymes. Insufficiency of this factor apparently results in the accumulation of toxic products of metabolism which are responsible for certain of the symptoms of the pellagra syndrome, particularly the dermatitis and probably the central nervous and mental symptoms. Jolliffe *et al.* (1940) have shown that the encephalopathy which occurs in chronic alcoholism and other states of chronic malnutrition responds to the administration of nicotinic acid but not to thiamin nor riboflavin. This syndrome is characterized by clouding of consciousness, cog-wheel rigidities, and uncontrollable grasping and sucking reflexes; it may or may not be associated with polyneuritis (due to lack of thiamin), with pellagra or with the oculomotor signs of central neuritis. These investigators believe that the symptoms are indicative of a complete deficiency of nicotinic acid while the stomatitis, the psychic reactions and possibly the dermatitis of pellagra represent a partial deficiency.

The common finding of Vincent's organisms in the mouth lesions of nicotinic acid deficiency, and their disappearance when the tissues become normal in response to the administration of nicotinic acid, has suggested the use of this factor in the treatment of Vincent's infection and in other forms of stomatitis where subclinical deficiency may play a part in determining the resistance of the mucosa to infection.

The dermatitis seen in pellagra is aggravated by irritants, whether mechanical or physicochemical. The effects of radiant heat and sunlight have been associated with altered pigment metabolism. The increased excretion of porphyrins which has been reported is said to be diminished after yeast, liver or nicotinic acid therapy.

Animal experimentation has produced some confusion with reference to pellagra. It would appear that pellagra in chicks (in which the Filtrate Factor is important) differs from pellagra in rats (in which there seems to be a deficiency of riboflavin or vitamin B_6 or both) and that this in turn is not the same as human pellagra (for which nicotinic acid is curative in part).

The rôle played by nicotinamide in biologic oxidations is well established. Since the essential pyridine nucleus is not formed in the body, it must be supplied in the diet. The various coöperating enzymes in tissue oxidation include co-carboxylase (*thiamin* pyro-

osphate), the yellow ferment (*riboflavin* phosphate + protein) d the co-dehydrogenases I and II which consist of nicotinamide, enine, ribose and phosphoric acid. It will be recognized that all ese are members of the B complex. The pyridine nature of tamin B_6 would suggest that it functions similarly.

Nutritional failure of these three vitamins has been reported to use disintegration of personality, including breakdown of morale rostig and Spies). The spectacular effects which have been served after thiamin, riboflavin and nicotinic acid therapy may ell be interpreted as representing enhanced ability to carry on idative processes in the tissues with a consequent sense of well-ing and vitality.

Salvesen has reported 3 cases of pellagrous dermatitis observed ring treatment of other conditions with thiamin and ascorbic id. The inference is that overdosing leads to a relative insuf-iency of nicotinic acid. Such observations emphasize the ndesirability of using high concentrations of separate vitamins cept as drugs for a limited period of time. A suitable supporting et should always be arranged.

Clinical Estimation of Deficiency.—The chief urinary end-product niacin metabolism is N′-methylnicotinamide, the presence of hich may be readily determined clinically. Estimation of body ores of this vitamin is based on quantitative determinations of ′-methylnicotinamide in the urine in the fasting state or follow-g a dose of niacin amide. This topic has already been discussed nder thiamin.

The requirement for niacin in common with thiamin and ribo-avin is altered by such conditions as infection, hyperthyroidism, regnancy and lactation, elevations of temperature, physical xertion and the nature of the diet. The Food and Nutrition oard of the National Research Council recommends for men eighing 70 kilos, who are moderately active and receiving a diet 3,000 calories, a niacin intake of 15 mg.

Yeast and liver are the outstanding sources of nicotinic acid, as riboflavin. Lean meats, poultry, canned salmon and haddock, ilk, green leafy vegetables, and wheat-germ are satisfactory sources the vitamin. Canning processes apparently do not appreciably iminish the activity of this relatively heat-stable factor.

In critical deficiency nicotinic acid as such is needed; foods ch in this factor are not satisfactory (Elvehjem). This acid is vailable in purified preparations for oral and parenteral admin-tration. For the treatment of pellagra Spies, Bean and Ashe ecommend 500 mg. daily in 50-mg. oral doses at hourly intervals. Iild cases, however, may require as little as 50 mg. and severe ones s much as 1 gram daily. Administered intravenously, the total aily dose is 40 to 80 mg. in physiologic saline (sterilized by auto-aving) given in 10- to 15-mg. amounts. Brown places the daily ose at 1.5 mg. per kilogram of body weight. Subcutaneous doses 100 mg. have been used.

Sodium nicotinate has shown less undesirable reactions than the acid. It is prepared by neutralizing a saturated solution of nicotinic acid with sodium bicarbonate, phenol red serving as indicator. Ultimately, the concentration is adjusted to 0.5 mg. nicotinic acid per cubic centimeter and the solution sterilized.

When nicotinic acid is given by mouth in doses of 50 mg. or more it usually results, within twenty to thirty minutes, in a marked flushing of the skin of the head and neck, sometimes extending to the lower extremities. Moore has shown that this reaction is accompanied by vasodilatation in the central nervous system. The usual intravenous dose of 10 to 20 mg. may produce within a minute increase in skin temperature, tingling and burning sensations, and changes in respiration, pulse-rate, and blood-pressure. There may also be an associated epigastric distress, increased peristalsis, and occasional belching.

Ruffin deplores the indiscriminate use of large doses of nicotinic acid because of possible toxic sequelæ. This investigator found daily doses of 70 to 100 mg. as effective as ten times that amount. Because of the associated distressing symptoms it would seem prudent not to administer nicotinic acid in amounts which produce reactions except when the patient is under observation.

It has been pointed out by Rosenberg (1942) that nicotinic acid is present in living tissues not in the free state but as the amide. Since both the amide and free acid are equally effective therapeutically and since the amide does not produce the unpleasant reactions attendant upon the use of the free acid, it would seem that the amide should be the clinician's choice in nicotinic acid therapy. The recommended dosages of the amide are the same as those of the free acid.

Vitamin B_6 (Pyridoxin).

Vitamin B_6 has been recognized for some years as a portion of the B complex which prevents a form of dermatitis in the rat. Various other terms (vitamin H, I, Y) have been applied to this factor. It has been isolated in pure form by Lepkovsky and its chemical constitution determined, $C_8H_{11}O_3N$. It is relatively heat-stable, even in alkaline solution, and is only partly soluble in water in its natural state. It is rendered soluble by autolysis of the complex of which it is a part. Vitamin B_6 exhibits basic properties and has been named pyridoxin. This substance is destroyed by long exposure to light.

The particular dermatitis produced by vitamin-B_6 deficiency in rats is a florid type of acrodynia. This disease can be cured by two different means: (1) By certain essential fatty acids, independent of vitamin B_6; and (2) by a rice-bran concentrate which contains vitamin B_6 and an "accessory factor" (Schneider, Steenbock, and Platz). The assay of anti-acrodynic potency of food cannot be taken as indicating solely the vitamin-B_6 content. Birch has suggested that vitamin B_6 is concerned with physiologic utilization of unsaturated fatty acids.

Although acrodynia or "pink disease" has been described in ldren, its cause has not been determined. György (1938), studying effect of cold temperature on the appearance of rat acrodynia, served striking similarity to the syndrome of chilblain in man and sed the question as to whether susceptibility may not be a function insufficient vitamin B_6 reserves.

According to Spies, Bean and Ashe vitamin B_6 is essential in man nutrition as judged by its preventive and curative effect certain parts of the pellagra syndrome. Four patients under otinic acid, thiamin chloride, and riboflavin therapy complained residual symptoms which included extreme nervousness, insomnia, itability, abdominal pains, weakness, and difficulty in walking. e administration of 50 mg. of pure synthetic vitamin B_6 in sterile lt solution brought immediate and spectacular relief; within enty-four hours all symptoms had disappeared. It would thus pear that pyridoxin is involved in muscle metabolism.

Both Spies and Jolliffe have been successful in the treatment paralysis agitans with pyridoxin. Jolliffe employed an in- avenous dose of 100 mg. daily and obtained spectacular return expression to the face, lessening of the rigidities and increased rength of movement. Whether or not the whole of the B complex necessary for sustained results has not yet been established.

Hypochromic microcytic anemia in dogs has been associated with etary deficiency in vitamin B_6 (Fouts, Helmer, and Lepkovsky).

Sources.—Fruits and vegetables are poor in vitamin B_6, fish and eat fair; seeds, legumes, and cereals relatively rich. Egg-yolk and any of the vegetable oils (linseed, peanut, rice, soybean, cotton- ed, corn and wheat-germ) are conspicuous for their high content. oth white and yellow cornmeal are good sources of pyridoxin which rves to distinguish this vitamin from the P–P factor. Vitamin B_6 s been reported in excellent quantity by Lantz in cooked pinto ans, but there may be considerable loss of the vitamin in soak- g water. Crude cane molasses is a good source of B_6 and also ntains some riboflavin; beet molasses is practically devoid of both ese factors. Cow's milk is equally potent in riboflavin and tamin B_6; human milk possesses the same potency for B_6 as cow's ilk, but only one-third the amount of riboflavin. Butter fat and ef fat contain pyridoxin.

Pantothenic Acid.

The eighth vitamin to be synthesized (Stiller, Keresztesy, and nkelstein, 1940) was designated pantothenic acid (*Gr.* "from erywhere") by R. J. Williams (1933). The older name for this itritional factor was "bios." It would appear to be of funda- ental nutritional importance. The vitamins essential for growth clude pantothenic acid, riboflavin, nicotinic acid, pyridoxin, and ctor W.

Pantothenic acid has been prepared as its calcium salt which is a ite crystalline powder $(C_9H_{16}O_5N)_2Ca$. It occurs in liver partly

combined with colloids from which it must be freed by autolysis. This acid is heat and alkaline labile.

There is no immediate promise that pantothenic acid will be assayed by colorimetric or other physical or chemical means. Available methods involve the growth response of yeast or a lactic acid organism. Using a bacteriologic method Stanbury, Snell, and Spies examined venous blood from 18 normal persons and found the vitamin to range from 0.19 to 0.32 micrograms per cubic centimeter (average 0.225 γ). Cases of pellagra, beri-beri and riboflavin deficiency showed a decrease of 0.05 to 0.09 micrograms (23 to 50 per cent) below the normal average.

Intravenous injection of as much as 100 mg. of calcium or sodium pantothenate into human beings has been made without untoward reactions. Following injections of pantothenic acid there has been noted an associated rise in blood riboflavin. Likewise, injection of riboflavin has induced an increase in the blood level of pantothenic acid. This is taken as evidence of the essential character of this acid in human nutrition. Presumably it is related to riboflavin in function.

In spite of the fact that a great deal has been said about the value of panthothenic acid in the prevention of human achromotrichia, controlled observations over a period of time have not borne out these contentions.

Sources.—Pantothenic acid is widely distributed in foods and is universally found in all animal tissues, including human. The highest concentration of pantothenic acid is found in the liver and kidneys, then in order the heart, spleen, brain, pancreas, tongue, lungs. Muscle tissue has the lowest concentration. Waisman, Michelsen, and Elvehjem discovered that stewing decreased the potency of kidneys, heart, and spleen by one-third. Frying did not destroy the pantothenic acid in liver, in fact the cooking seemed to improve the growth-stimulating potency.

Vitamin H (Biotin).

Although "vitamin H" has been used to designate a variety of factors, it is currently employed (György) to describe the detoxifying agent of vitamin-like character which prevents egg-white injury. There is increasing evidence that vitamin H, biotin, and coenzyme R are closely related if not identical. Possibly this vitamin functions in intermediary carbohydrate metabolism in conjunction with members of the B complex to which indeed it may belong. As pointed out by Eakin *et al.* the action of vitamin H in protecting against the injury caused by a diet containing egg-white is somewhat unique in that the diet cannot be considered to be deficient in an essential food constituent. The injury caused by egg-white is due to a protein called "avidin" which combines with biotin to form an unabsorbable complex, thus rendering the dietary biotin non-available to the organism.

The naturally occurring organic complex is insoluble both in fat ıd water. During autolysis of yeast, the water-soluble vitamin H set free. On proteolytic digestion (with pepsin or, better still, ıpain) it is released from some substance present in liver. The tamin possesses acidic properties. It may be autoclaved at 200° C. r one to two hours without deleterious effect. It is also resistant boiling and treatment with acid or alkali.

The toxicity of egg-white in experimental animals is an established ct. It is associated with a characteristic dermatitis of the seborrheid esquamative type. Deep brown pigmentation may occur.

Sources.—The main sources of vitamin H are liver, kidney, east, and to a lesser extent cow's milk. Breast milk possesses only ight potency. Cane molasses is rich in this vitamin. Thymus ıd spleen are without vitamin-H activity. Beef muscle not only ontains no vitamin H but actually tends to aggravate existing egghite injury.

FOLIC ACID

The most recent member of the Vitamin B complex to receive ttention is folic acid. This substance has also been called Vitamin I, B_c, Factor U and Lactobacillus Casei Factor. This multilicity of names has come about by virtue of the fact that several roups of investigators, all working independently, have isolated he same substance and had, during their investigations, given his unknown factor a name corresponding to the experimental rganism which they were using at the time.

In 1932, Wills and Billimoria, working in India, described a nacrocytic anemia in monkeys which was accompanied by leukoenia, diarrhea and megaloblastic changes in the bone marrow. 'his condition was produced through the feeding of purified diets ontaining adequate quantities of all nutrients but lacking some omponent of the vitamin B complex. Improvement could be rought about by giving yeast.

In 1935, Day, Langston and Shukers reported an analagous yndrome resulting from a diet deficient in riboflavin and possibly ther B complex factors but not deficient in thiamin. They found hat adding riboflavin did not correct the condition but it could e prevented by giving liver extract or yeast. They suggested hat some other unknown factor was responsible for the improvenent and called this factor "Vitamin M".

Stokstad and Manning reported in 1938 that chicks required, or normal hematopoiesis, a factor found in yeast, alfalfa and wheat ran. This they called "Factor U". It was further reported in 939 by Hogan and Parrot that the absence of this necessary factor esulted in a macrocytic hyperchromic anemia as well as retarded rowth. They found that they could prevent this syndrome by sing an extract of liver which contained a factor called by them 'Vitamin B_c".

In 1941, Stokstad, working with cultures of lactobacillus casei, reported a factor necessary for the growth of these organisms found in liver. This he called the "Lactobacillus Casei Factor".

Further investigation by various workers showed that the lactobacillus casei factor behaved biologically as Vitamin M and that it could also be used in the prevention of chick anemias. Since the various anemias produced experimentally were macrocytic in character and since they were apparently all benefited by the use of this same substance, it soon became apparent that the various factors described were probably all the same substance or several substances very closely allied. The name Folic Acid was first used by Mitchell, Snell and Williams, in 1941, who isolated this substance from spinach. The name "Folic" is derived from the Latin "folium" signifying leaf. Folic Acid has since been isolated in pure form and more recently (1945) prepared synthetically.

The liver lactobacillus casei factor was found to be composed of a pteridine (a two ringed nitrogen compound), para-aminobenzoic acid and glutamic acid. The name "pteroyl glutamic acid" has been suggested for the complete compound. Fermentative lactobacillus casei factor contains two additional glutamic acid groups. Pteroyl glutamic acid is practically non-toxic and has recently been used in the treatment of macrocytic anemias of sprue, and pernicious anemia as well as dietary macrocytic anemia and the macrocytic anemias of pellagra, pregnancy and infancy.

Regarding the function of folic acid, little is understood. Stokes, in 1944, showed that certain bacteria which normally required this vitamin could get along without it if a large amount of thymine (a component of nucleic acid) was added to the medium. He demonstrated that these bacteria, grown in this manner, were devoid of L casei factor and suggested that the function of folic acid in these organisms might be to assist in the synthesis of thymine.

VITAMIN C.

The ability of fresh fruit and vegetables to protect against scurvy is due to the presence of a factor known as vitamin C, now identified as *ascorbic acid*, C_6H_5OH, a carbohydrate derivative. The term *cevitamic acid* has been suggested as a more suitable name, but has not achieved popularity.

Physical and Chemical Properties.—Ascorbic acid is a white crystalline powder, soluble in water and insoluble in oils. When dried, it is stable on exposure to air and daylight at room temperature for years; development of a buff color is not attended by appreciable decomposition (King, 1939). Aqueous solutions, however, are readily oxidized, especially in the presence of flavins or light. An alkaline medium is more destructive than an acid one. The vitamin is inactivated by heat only in the presence of oxygen. Commercial canning processes which exclude air thus preserve a

ge part of the vitamin C, but home canning is usually more structive. Storage of fruits and vegetables at ordinary temperaes leads to gradual loss of the vitamin, but refrigeration retards s loss, and frozen foods usually retain their potency. The treme sensitiveness of ascorbic acid to oxidative change necessiles unusual care in food processing to prevent serious loss of amin activity. It should be stressed that food tables usually port the vitamin-C potency of raw, fresh products. The information therein may be wholly misleading with reference to these same ods as eaten.

The outstanding chemical characteristic of ascorbic acid is its werful reducing action. Oxygen combines with it in two stages form: (1) *dehydro-ascorbic* acid which is easily reduced in the dy to the original state and thus is equivalent to active vitamin C; d (2) a more completely oxidized product which is irreversible and active. Vitamin C assays, therefore, must determine both the tive unoxidized form (ascorbic acid) and the reversibly oxidized e (dehydro-ascorbic acid).

Not all of the various forms of ascorbic acid which have been nthesized (Zilva, 1935) possess antiscorbutic activity. Of the ven structural variants which have been already prepared, *l*-ascor- acid shows the greatest potency and is the compound indicated hen vitamin C or simply ascorbic acid is mentioned. Physiologic tivity apparently is associated with the spatial arrangement of e oxygen bridge (see p. 834).

Physiologic Action and Deficiency Effects.—Ascorbic acid is entified as one of the series of intracellular oxidation ferments cessary for the metabolism of foodstuffs by the cell. All actively owing parts of the higher plants are rich in vitamin C. Animal ssues of high metabolic activity have greater concentrations of corbic acid than those with a lower metabolism. With the proession of age, therefore, the tissues show a diminishing vitamin-C ntent. The pituitary gland, corpus luteum, adrenal cortex, thyid gland and liver are especially rich in this factor. With the ception of man, certain of the apes, and the guinea-pig, animals e capable of synthesizing the vitamin from some unknown prersor, possibly glucuronic and galacturonic acids.

Many functional rôles have been assigned to vitamin C. These clude maintenance of capillary resistance, coöperation with vitain D in the formation of normal bone and tooth structures, and otection against bacterial invasion of the tissues. Vitamin C is ncerned with the elaboration of certain intercellular colloids, otably the cementing substances which occur in the matrices of one, in the capillary wall, in cartilage and dentin. Anatomic anges have been described in teeth during the developmental perd and in bone formation due to alteration of the intercellular bstance produced by osteoblasts when the vitamin-C supply is adequate. According to Eddy (1930) several times as much

ascorbic acid is required to forestall malformation of teeth as is needed to prevent macroscopic evidence of scurvy.

Vitamin C is very definitely related to calcium metabolism. It is known that calcium salts in dilute solution are not completely ionized. Organic ions form complexes with Ca^{++} with apparent increase in the solubility of such compounds as $Ca_3(PO_4)_2$. Ascorbate is particularly effective in this regard (Greenwald, 1938) thus influencing the deposit of calcium in tissues. Clinically, this is borne out by the disturbances of calcification noted in scurvy.

The classic picture of outstanding vitamin-C deficiency is scurvy, characterized by periosteal hemorrhages about the joints, swollen and bleeding gums, and often anemia. Lesser degrees of inadequacy when long continued have been shown to produce a variety of effects in different tissues. In the growing young, defects occur in the development of bone, cartilage and dentin.

Even slight degrees of vitamin-C deficiency tend to weaken the capillaries and predispose to the occurrence of capillary hemorrhages. This has been made the basis of the commonly used capillary resistance test for vitamin-C deficiency, in which the relative intracapillary pressure is increased by the application of a tourniquet to the arm or by applying a suction cup. The occurrence of petechial bleeding in response to this test suggests vitamin-C deficiency, but since other factors may also predispose to such bleeding, it cannot be regarded as specific unless the administration of vitamin C is subsequently curative.

It should be mentioned here that capillary fragility is increased in such conditions as scarlet fever and high blood pressure and is decreased in severe anemias of any kind, especially when the red blood count is less than 3,000,000 per cmm.

Vitamin-C deficiency has been shown to retard the process of wound healing and is receiving considerable attention in surgery for this reason. This effect has led to the hypothesis that ascorbic acid is intimately concerned with the intercellular cement substances not only of the blood-vessels, bones and teeth but also of other tissues. Its relation to these substances may be a direct one, or it is possible that the effect of deficiency upon the intermediary metabolism of foodstuffs within the cell leads to excessive accumulation of partially metabolized products which are responsible for some of the tissue abnormalities described.

The high concentration of vitamin C in certain organs may be indicative of specific functions in these tissues, while its presence in the liver may mean only that this organ acts as a storage depot. It is thought that its occurrence in the adrenal gland and in the eye indicate special functions. Thus, while the lens is normally high in ascorbic acid, the concentration has been found to be much smaller when cataract is present. There is evidence that the high concentration in the adrenals is linked with a close relationship between vitamin C and the cortical hormone. Deficiency of ascorbic acid has, therefore, been related to Addison's disease and

ier pathologic pigmentations (Hoff, 1936). Depigmentation of e skin following massive doses of this vitamin has been reported Abt and Farmer (1938). Daily oral administration of 450 mg. the acid resulted in considerable depigmentation after six to n weeks without relieving other Addisonian symptoms.

Much work has been done on the relationship between vitamin C d bacterial infections and toxins. It would appear that resistance ertain infections is raised in the presence of an abundance of corbic acid and that resistance to diphtheria toxin, for instance, likewise increased. Subnormal levels of the vitamin in the blood ve been shown to exist in fevers and a variety of other diseases, ch as tuberculosis and rheumatoid arthritis. Under these cirmstances, administration of large doses of ascorbic acid does not adily raise the blood level nor the urinary excretion. A high ily intake, therefore, should be assured.

Subnormal ascorbic acid storage presumably is a fairly common currence. The fact that scurvy may develop insidiously in pants treated for various ailments requires constant alertness on the rt of the attending physician to sense its presence promptly in the ipient stages or, better still, to provide against its development.

"Essential" hematuria has responded to ascorbic acid in doses of 0 to 300 mg. given orally and intravenously (Burkland, 1939).

Vitamin C has been found to influence the metabolism of tyrosine as to prevent the excretion of homogentisic acid in man (Sealock d Silberstein, 1939).

Clinical Estimation of Deficiency.—Capillary resistance tests have joyed considerable popularity. Göthlin (1931) employs a positive essure technic whereas Dalldorf (1935) uses negative pressure. th of these experimenters stress that vitamin-C deficiency is not e only causal factor in hemorrhagic diathesis. A positive test ould not be interpreted as indicating deficiency unless administion of ascorbic acid diminishes the hemorrhagic tendency; when does so, the test is useful as an index of therapeutic response. egative results tend to exclude the possibility of vitamin-C deficncy. Severe anemia may cause a false negative response to this t (Sloan, 1938), as mentioned previously.

Since any number of drugs have been discovered to produce pillary fragility in sensitive individuals, tendency for hemorrhage occur may often be associated with entirely normal blood and ne ascorbic acid findings. True thrombopenic purpura and hemoilia do not benefit from vitamin-C therapy. Where the hemorgic condition responds dramatically to such treatment, deficiency n be regarded as established. On the other hand, a perfectly rmal capillary resistance test may be encountered together with extremely subnormal blood ascorbic acid and diminished storage indicated by saturation tests. Possibly this represents transient acute deficiency before a sufficient interval of time has elapsed affect the capillary wall.

The most satisfactory tests involve determinations of blood and ne ascorbic acid concentrations since extremely low levels (as

6

0.2 mg.) are needed for production of abnormal capillary fragility. The normal fasting plasma level is 0.6 to 1.4 mg. per cent. The upper limit probably represents the renal threshold, since the urinary excretion of Vitamin C is increased sharply when the plasma level exceeds this value. Absorption of ascorbic acid reaches a peak four to six hours after ingestion. The normal adult on an average satisfactory diet excretes 20 to 30 mg. and the normal child 10 to 30 mg. *per diem*. The amount which appears in the urine reflects, as a rule, not only the current intake but also the degree of saturation within the body.

Numerous investigators have devised tests to measure vitamin-C saturation. These are performed by giving test doses ranging from 100 to 1000 mg. by oral, subcutaneous or intravenous routes and determining the amount excreted in fixed time. The variety of these procedures would indicate that none is entirely satisfactory. The diagnostic burden placed upon these tests is frequently too great. A saturation test may show depleted reserves if the vitamin-C intake has been below normal for only a few days preceding the test and it may show good storage after only a day or two of high intake; it gives no information as to the adequacy of the customary diet unless this happens to be the test diet. It must be remembered that clinical vitamin-C deficiency is the result of a more or less constantly low intake over a considerable period of time.

If 1 gram of ascorbic acid in 10 cc. of water or saline is given intravenously, at least 450 mg. should appear in the urine within five hours. To offset the error due to retention in renal insufficiency, Ludden and Wright (1940) collect the urine after ninety minutes and at the end of the five-hour period. From an empirical formula is calculated the probable twenty-four-hour excretion which is called the **saturation index**:

$$\text{Saturation Index} = \frac{ab}{1.27a - 0.26b}$$

Where a = 90 minutes' excretion
b = *total* 5-hour output.

Under normal conditions, this index is greater than 500 mg. and may reach 800 to 1000 mg. in the "saturated" subject.

Kajdi *et al.* (1939) modified the saturation test by determining the plasma concentration before and four hours after an intramuscular injection of 200 mg. of ascorbic acid. The initial value was found to be an unsatisfactory criterion of deficiency but results on the second specimen below 0.6 mg. were associated with serious depletion and below 0.2 mg. with scurvy. A more sensitive index was obtained by multiplying the initial plasma concentration by the increase shown in four hours times 100. In normal subjects, this index usually exceeded 10; in clinical scurvy it fell below 0.8 and varied from this level to 6 when the body reserves were definitely depleted.

Slobody (1944) describes an intradermal decolorization test performed by injecting 0.05 cc. of N/300 dichlorophenolindophenol

the skin. The time required for decolorization was then ed. He reports that of 59 patients with blood vitamin C level w 0.3 mg., decolorization required more than fourteen minutes 4 of these cases. A skin test time of more than fourteen min- would thus suggest a definite degree of body unsaturation. cases of mild unsaturation, decolorization time was found to nine to thirteen minutes, whereas normal subjects required less n nine minutes.

nvestigating the relationship between intake, blood level, reten- and excretion in adults, Ralli *et al.* (1939) found complete ration of the tissues only when the plasma level was maintained mg. per cent; this required the intake of 100 mg. daily. At intake there was maximum retention—approximately 90 mg. nd a constant low excretion of 8 to 13 mg. *per diem*. When the ount ingested was reduced 50 per cent, the plasma concentration to about 0.4 mg. per cent. At this level, although the tissues e not saturated, there were no signs of deficiency and these estigators considered 0.4 mg. the lower limit for normal plasma. lhunter and Robbins (1940) found that more than 120 mg. were uired daily to maintain the plasma level at 1.4 mg. per cent.

)n the other hand, von Drigalski and others have observed less stant relationship between intake and plasma concentration of orbic acid. Unquestionably, values over 1 mg. per cent are irely normal. Deficiency is suggested at 0.5 mg., although efinite constitutional factors may affect the plasma level, espe- ly where it is noted that high intake does not result in elevation the concentration. In ulcerative colitis and other intestinal turbances the plasma level may be very low (0.1 to 0.3 mg. per t) with normal or abnormal capillary fragility.

Iawley and her co-workers (1936) have shown with normal lts that the production of high urinary acidity with ammonium oride is associated with appreciable increase in the excretion of amin C whereas alkalinization with sodium bicarbonate markedly ninishes the output. It is possible that the decrease in the latter tance is apparent rather than real, destruction occurring in the aline bladder urine. It would seem desirable, however, to supply ra vitamin C in the diet whenever urinary acidification is under- en. Aspirin sometimes appears to "wash out" ascorbic acid; cylate therapy in general may well be accompanied by additional tary vitamin C.

Requirement. The **International Unit** of vitamin C is equivalent 0.05 mg. of *l*-ascorbic acid. The Sherman unit is approximately times as great. It is customary, however, to express require- nts in terms of milligrams rather than in units.

There is general agreement that bare adequacy is in the neighbor- d of 20 mg. for infants, 40 mg. for children and 50 to 60 mg. for lts. Since there is every advantage in liberality, at least double se amounts are advisable to provide ample margin against in- sed individual need and against loss of the vitamin during

storage or processing, which makes it difficult to estimate the intake accurately.

The recommended allowance of the Food and Nutrition Board of the National Research Council is 75 mg. for a man weighing 70 kg. and 70 mg. for women weighing 56 kg. In pregnancy and lactation this is increased to 100 and 150 mg. respectively. For children, the recommended allowance varies from 30 mg. for infants to 100 mg. for youngsters sixteen years of age. These values represent amounts above minimum needed to protect against scurvy, but below those needed for saturation.

Hard labor, fevers, infections (particularly tuberculosis and diphtheria), leukemia, hyperthyroidism and malignancy are known to make greater demands upon the vitamin-C stores. Warren *et al.* (1939) have found that cases of peptic ulcer utilize 20 per cent more ascorbic acid than normals, the daily requirement for maintaining saturation being 0.91 to 1.20 mg. per kilogram of body weight.

Sources and Administration.—Certain observations suggest the possibility of other factors being associated with vitamin C in the common fruit and vegetable sources, although these have not yet been definitely established. For this reason, as with the other vitamins, the natural foods are to be preferred to the purified or synthetic ascorbic acid whenever possible.

Although vitamin C is widely distributed in **fresh** fruits and vegetables, considerable potency is lost during storage, sun-drying, cooking in much water in open kettles, and preserving. The diet should contain an abundance of **fresh** fruits and vegetables to insure an adequate intake of this vitamin.

According to Kirk and Tressler (1940) ascorbic acid is twice as plentiful in strawberries as in orange juice. Raspberries and turnips are equivalent to tomato juice. Blueberries, plums and peaches contain smaller amounts. These investigators detected only a trace of this vitamin in blackberries, cherries, and dewberries. Elliott (1939) found black currant juice to be 50 per cent richer in ascorbic acid than the common citrus fruits.

The citrus fruits and tomato juice (fresh, canned or bottled), although not extraordinarily rich, furnish a convenient source of ascorbic acid. Activity is conserved in canned and frozen grapefruit juice and in frozen orange juice, but deteriorates rapidly on standing in air. "Fully ripe oranges contain more of the vitamin than partially ripe fruit, and that exposed to sunlight is richer than than that from the shaded side of the tree. The vitamin-C content of a given variety of orange decreases progressively as the season advances."—Munsell (1940). A dozen oranges of uniform size and appearance purchased from a single bin in a store in Washington, D. C., were found by the Bureau of Home Economics to range in vitamin-C content from 24 to 60 mg. of ascorbic acid per 100 cc. of juice.

"In apples, the vitamin is concentrated in the skin and in the flesh just under the skin. Since the proportion of skin to flesh is

ater in small than in large apples, a small apple contains more amin C in proportion to its weight than a large one." -Munsell 40).

Fresh pineapple juice frequently is no more than half as potent ascorbic acid as orange juice; the canned product is still less active. esh guava juice is equivalent to fresh pineapple juice (Miller and bbins, 1936).

Milk fresh from the cow has a good supply of vitamin C, but by e time it is bottled and delivered to the consumer little of this amin remains. Its destruction is said to be brought about by oflavin in the presence of light and air. Hand and his co-workers 39) have devised a method for bottling milk in a vacuum so t it retains its ascorbic acid. Such milk contains enough vitan C to prevent the development of scurvy if a quart is ingested ly. According to Pratt (1940) pasteurization of milk in an nosphere of CO_2 conserves its vitamin-C content. The ascorbic d in human milk, unlike that in cow's milk, is believed to be comed in part with protein; this union is broken by boiling (Albrecht, 39).

Although raw meats (especially organs) may contain considerable amin C, practically all activity is lost during cooking.

Under ordinary circumstances, ample vitamin C can be provided its natural state in various foods. This is impractical, however, ere large doses are required. Ascorbic acid is available for oral parenteral use, doses of 50 to 500 mg. daily being common. An tial dose of 1 gram is frequently employed. Where prompt ponse is not encountered with oral therapy, the possibility of fective absorption must be considered even though there is no parent reason for expecting it. Parenteral administration, there-e, is favored particularly in initial treatments.

VITAMIN D.

Physical and Chemical Properties.—According to Bills (1938) ere are at least ten substances possessing some antirachitic tency. All are secondary alcohols with a typical alicyclic struc-e (that is, ring compounds with straight chain characteristics). ith the possible exception of cholesterilene, the various forms quire irradiation to produce an antirachitic effect. In this process e complex nucleus is ruptured and the products are no longer erols, though often regarded as such. When ergosterol is irradi-ed, the result is calciferol or **vitamin D_2**. Cholesterol when so ated first becomes 7-dehydrocholesterol, then the ring is broken th the formation of **vitamin D_3**. Vitamin D_4 is obtained by adiation of 22-dihydroergosterol and is 22-dihydrocalciferol. e fifth well-known member of the vitamin-D series is irradiated dehydrositosterol. The two forms most abundant in the prepa-tions available for clinical use are D_2 and D_3.

Calciferol or D_2 (irradiated ergosterol) is a colorless, crystalline stance soluble in oils but not in water. It is not regularly

affected by oxygen, dilute alkali nor acid. Calciferol is destroyed by steam in the presence of mineral acids. It is stable to heat and light. Ultra-violet irradiation of ergosterol produces several isomers in addition to calciferol (lumisterol, tachysterol, toxisterol, etc.) which are not only without antirachitic activity but which may have undesirable or toxic effects. Overirradiation destroys the antirachitic vitamin and results in end-products which are highly toxic. Although relatively stable to heat and oxidation, the provitamins give a better yield on irradiation if oxygen is withheld during exposure.

In general, ergosterol is the precursor of vitamin D in vegetable organisms, and calciferol or D_2 is the form of vitamin D produced by irradiation of substances of vegetable origin, while D_3 (activated cholesterol) is the form derived from animal sources. Since vitamin D_3 is found in fish-liver oils, it is sometimes referred to as **natural vitamin D.**

Physiologic Action and Deficiency Effects.—Vitamin D exerts a curative effect on rickets. Precursors (as cholesterol) in the skin are transformed into active vitamin by solar irradiation. Rays shorter than 3200 Angstrom units prevent and cure rickets. Irradiation of the skin by wave lengths shorter than 2800 Å are harmful to the skin. The lower limit of summer sunlight is about 2900 Å. Hou cited by Clouse, gives as the seat of activation the sebaceous secretion of the skin, since light falling upon skin cleansed with ether prior to exposure confers little protection. Because pigmentation of the skin reduces its permeability to sunlight, negro babies and dark-skinned races require more ultra-violet for prevention or cure of rickets than do white children. The vitamin is absorbed when administered by massage with cod-liver oil or other fats containing it.

Vitamin D is necessary for normal bone formation by the osteoblastic tissues and for normal retention of calcium and phosphorus in the animal body. It tends to protect dental and bone structure against the effects of a low dietary calcium intake by promoting better utilization of available calcium and phosphorus, and it tends to stabilize calcium and phosphorus metabolism at normal levels when the dietary intake varies markedly or is disproportionate. Ordinarily, when calcium intake is forced the serum calcium rises and the phosphorus level falls, but addition of vitamin D restores normal levels. The interrelationship between this vitamin and mineral metabolism is discussed elsewhere (page 117.)

Calciferol seems to increase the absorption of calcium and this in turn favors phosphorus absorption. It raises the blood serum calcium slowly. Dihydrotachysterol, which is used in the treatment of tetany to restore low serum calcium to a normal level, also increases the absorption of calcium, but it is not anti-rachitic. The effect of therapeutic doses of vitamin D, dihydrotachysterol (A. T. 10), and parathyroid extract upon the behavior of calcium and phosphorus has been depicted by Shohl (1939) utilizing data from Albright (1938–1939.)

	Calcium in serum.	Phosphate in serum.	Calcium absorption.	Phosphate excretion.
Vitamin D	+	+++	+++	+
A. T. 10	++	++	+	+++
Parathyroid extract .	+++	−	○	++++

The actual mechanism whereby vitamin D enables the body to posit adequate amounts of bone salts is not known. In rickets ere is no impairment in the ability of the bone to become calcified. The reaction encountered by ingested food as it passes through e alimentary canal determines in part the fate of calcium and osphorus. Acidity increases solubility whereas alkalinity reduces Acidity of the absorbing area, therefore, is requisite for utilizan of these elements. On the other hand, increased acidification the urine leads to increased excretion, particularly of the calcium. nose diets which yield a metabolic residue which is acidic tend to luce the body's stores of calcium and phosphorus.

Hamilton *et al.* (1933, 1937) found that "rachitogenic" diets pplemented with organic acids (sodium citrate, sodium tartrate, dium bitartrate, citric acid, tartaric acid—in the order of their ectiveness) failed to produce rickets in rats. On the other hand, n-rachitogenic diets could be made so by addition of a mixture of nmonium chloride and ammonium carbonate. In part this may said to demonstrate that intestinal acidity enhances the absorpon of calcium and phosphorus whereas alkalinity hinders it and at metabolic alkalinity (from formation of carbonates from the ganic acids) aids in the retention of these elements while increased inary acidity aids in their excretion.

Shohl[1] (1937) considers that these results are not due solely to e acid-base relationship of the diet, but to a possible specific antichitogenic effect of the organic acids. In his experiments, citric id gave a more pronounced effect than tartaric acid.

When fats are not utilized, fatty acids become available for the rmation of insoluble calcium soaps which are excreted in the feces. tty diarrhea and celiac disease, therefore, may be accompanied by kets.

Mellanby was the first to suggest that vitamin D functioned in e prevention of dental caries. Although McBeath (1937) has conmed this relationship, the mode of action is still obscure, and it ould be mentioned that many investigators have been unable to event caries by the administration of vitamin D.

Clinical Estimation of Deficiency.—The diagnosis of vitamin D ficiency is based upon the clinical picture of rickets, upon Roentn-ray evidence of defective bone formation at the epiphyses, and on blood serum calcium, phosphorus and phosphatase levels. In kets the inorganic phosphorus falls to half its normal level; the lcium usually is slightly low. Normal serum calcium varies from to 11 mg. per cent. The inorganic phosphorus varies with age; infants 5 to 6 mg. are normal, for children 4 to 5 mg., and for ults 3.5 to 4 mg. P per 100 cc. Therapeutic measures for rickets

[1] Shohl, A. T.: Mineral Metabolism. New York Reinhold Publishing Corp., 9.

are generally held to be efficacious if the calcium remains above 9 mg. and the phosphorus above 5 mg. per cent. When the product of these two values (Ca × P) falls to 30 or lower, rickets usually is present. Hypervitaminosis D is evidenced by elevation of the serum calcium and phosphorus to as much as 50 per cent above normal.

Phosphatase has been determined by a number of different methods. Probably the most commonly employed procedure in America is the original Bodansky method (1932–1933) or some modification. Normal adults vary from 1.5 to 4 Bodansky units, averaging 2.7; normal children show a range from 5 to 12 units, averaging 8. The enzyme activity reaches 20 to 30 units in mild and 60 or more in severe rickets. The pronounced deviation from normal phosphatase activity renders its determination of great value. If the therapy employed is effective, a definite decrease is noted in three to four days; during active repair, high normal values are encountered. Treatment should be continued for some time after the normal level has been reached to insure complete healing.

Requirement.—The vitamin D requirement varies with the amount of solar or artificial irradiation received, with the amounts of calcium and phosphorus in the diet, and with the proportion between calcium and phosphorus. With better than average ingestion of these minerals in the ratio of 1:1 the need for vitamin D is diminished (p. 117). To quote Jeans and Stearns (1939): "It appears from available evidence that vitamin D is not as well utilized on a unit for unit basis from the more concentrated preparations as from those preparations in which it is more widely dispersed. The most desirable concentration has not been determined, but apparently the concentration found in cod-liver oil is as effective as any lesser concentration studied." Stating the requirements in terms of a concentration no greater than that encountered in average high-grade cod-liver oil, Jeans and Stearns recommend 300 to 400 U.S.P. units for both artificially and naturally fed human infants, although the latter is known to require less. Premature infants should receive twice this daily dose during the early period of most rapid growth. This same allowance (300 to 400 units) is satisfactory for school children who also receive at least 750 cc. of milk daily. There is evidence that activated cholesterol, as found in fish oils, egg yolk and irradiated milk, is more effective, unit for unit, than calciferol (viosterol) in the prevention and cure of human rickets.

The vitamin-D requirement, as well as that of calcium and phosphorus, is increased by rapid growth to such an extent that when young infants are growing rapidly it may be impossible, even with adequate supplements of calcium, phosphorus and vitamin D, to prevent some transitory evidence of rickets at the epiphyses. Apparently, the growth stimulus may be so great that calcification is unable to keep pace with bone growth.

Little is known about the adult's requirement for vitamin D, no definite pathologic changes having been correlated with such de-

ency in the adult. It is quite likely, however, that the vitamin necessary for the maintenance of normal health and resistance. e beneficial effect of solar or artificial ultra-violet irradiation and cod-liver oil upon health and resistance, and their usefulness in treatment of tuberculosis and other diseases are well established; ere is reason to believe that this is not due solely to the vitamin A cod-liver oil but that the vitamin D and perhaps other sterols ntribute to it.

During pregnancy and lactation at least 800 units daily should be ovided; exact information regarding the requirement in these conions is not yet available.

The **U.S.P.** and **International Unit** of vitamin D is equivalent to 025 microgram of calciferol. Other units, now rarely used, inide the Steenbock, American Drug Manufacturers' Association .D.M.A.) and Oslo units (refer to p. 834).

Sources and Administration.—Irradiated yeast and milk from ws fed with such yeast (so-called metabolized milk) contain vitan D_2 since this results whenever ergosterol is subjected to ultraolet treatment. On the other hand, vitamin D_3 predominates in h liver oils, in eggs from hens fed cod-liver oil, and in irradiated lk and milk fortified with fish-oil concentrates (Zucker process). is is due to the fact that 7-dehydrocholesterol is the chief agent und in animal sterols. It is this form of vitamin D which premably is generated in the skin under the action of sunlight. e fish-liver oils, however, probably contain a multiplicity of forms.

Despite the fact that green vegetables are grown in sunlight, ey are practically devoid of antirachitic potency. Mushrooms, asts, and molds contain appreciable amounts of ergosterol which sponds to irradiation. Irradiated ergosterol is sometimes added to mmercial cake and bread. It is stated that 6 slices of bread, so rtified, contain as much vitamin D as 1 teaspoonful of cod-liver . Cereals have been successfully fortified, but the amount of tamin per serving is so small as to be negligible.

Irradiated milk is a desirable form of vitamin-D fortification. A rge percentage of evaporated milks on the market are "vitamined." An increasing number of dairies sell milk enriched with vitain D. As stated by Nelson (1938) fish which contain much body , such as salmon, sardines and herring, are the richest natural urces; eggs are next in importance; milk fat and meat products ntain some vitamin D. Outstanding sources are the fish-liver s, and it is well to be guided by the years of experience which ve given cod-liver oil its place as a vitamin source. In this conction, one should remember that cod-liver oil is not only an cellent source of vitamin D, but that it is also rich in vitamin A d that, as previously mentioned, the other sterols, lipoids and fatluble substances contained in it may well prove to contribute to nutritional value.

Lindsay and Mottram (1939) advocate using cod-liver oil as an gredient in any dish which already contains fish. If this subter-

fuge is not revealed by the cook, the comestible usually is acceptable. For the low income groups, herring and canned salmon probably provide in an average serving adequate vitamin D for the adult's daily need.

Since most foods contain little or no vitamin D, exposure of the body to ultra-violet light or the use of fish-liver oils or vitamin D concentrates is necessary for therapeutic dosage. Like vitamin A, the fat-soluble D may be introduced into the body by application to the skin. It is not the province of this text to review the many pharmaceutical preparations which are available to the physician. Needless to say, only those which have been standardized and whose potency is clearly stated should be employed.

Cod-liver oil is required by the U. S. Pharmacopœia to contain at least 85 U.S.P. units per gram. As computed by Nelson (1939) a teaspoonful contains at least 312 units, calculated on the basis that this amounts to 4 cc. and the oil has a specific gravity of 0.92.

Overdosage of Vitamin D.—Vitamin-D concentrates should be regarded as medication, not food. Overdosage has been shown to produce toxic effects and abnormal calcium deposits in animal experiments. According to Shohl (1938) the renal tubules, blood-vessels, heart, bronchi, and stomach are the organs most affected by metastatic calcification. These tissues and the liver undergo degeneration. Since these changes are associated with elevated serum calcium and inorganic phosphorus levels, their determination may serve as a warning of excessive therapy.

The symptoms brought on by "vitamin-D" toxicity appear about two weeks after the high dosage begins (Maynard, 1938). The patient is nauseated, dizzy, and experiences tingling sensations in the extremities. There may also be vomiting, diarrhea and polyuria. It is not yet established whether these toxic symptoms and the abnormal calcium deposits in the tissues are due entirely to overdosage of vitamin D or whether they are caused by the presence of undesirable side-products of the irradiation process. Preparations of ergosterol, improperly irradiated, contain toxisterol, so named because of its effect. There is some evidence that large doses of cod-liver oil or irradiated cholesterol are less toxic than irradiated ergosterol (viosterol).

It has also been reported that doses of viosterol and of vitamin D of animal origin which are equivalent for the rat are not equivalent for the human infant, the cholesterol derivatives being more effective. Since vitamin-D preparations are standardized on the rat, this would mean that fewer units would be required of the fish-oil derivatives than of viosterol for adequate protection.

Enormous doses of vitamin D have been recommended for the treatment of arthritis and other conditions in the adult. It cannot be taken for granted that such dosage levels are devoid of harmful possibilities; doses larger than 1000 to 3000 U.S.P. units daily should not be administered without careful consideration and supervision.

VITAMIN E.

Physical and Chemical Properties.—Vitamin E, like vitamin D, pears to include a number of different forms of a parent substance several separate factors. Several tocopherols have been obned, the most potent being the alpha form which occurs as a light llow viscous oil. The name is derived from the Greek, *to bear spring.* Ferric chloride oxidizes α-tocopherol to α-tocoquinone nich still possesses vitamin-E potency equal to the tocopherol merson *et al.*, 1939). If oxidation proceeds further, there is loss activity. The vitamin was originally obtained from wheat-germ as *α-tocopherol allophanate* and as such is commercially available.

Vitamin E is fat-soluble and, like vitamins A and D, is not saponible. Cooking, drying, steam distillation, and sterilization have harmful effect. The vitamin is stable to ordinary light, but is stroyed by prolonged ultra-violet irradiation. Aëration at 97° C. r twelve hours does not destroy it, yet vitamin E is extraordinarily nsitive to slight and obscure oxidative changes in the fats which rve as its vehicle. Vitamin E is usually inactivated if included in a et containing lard due to rapid development of rancidity.

The vitamin is not affected by acids, alkalies, or hydrogenation. he influence of air or mild oxidizing agents is not serious but ozone, lorine, permanganate and ferric chloride destroy it.

Either vitamin E or some agent found with it tends to protect tamin A against oxidation.

Physiologic Action and Deficiency Effects.—Vitamin E is conrned in the female with the blood supply and nutrition of the nbryo, and in the male with the maintenance of testicular function. nadequacy of vitamin E in the male rat has been found to increase ie production of gonad-stimulating hormone by the anterior pituiry and increase its content of basophilic cells, an effect similar to nat produced by castration.

Wheat-germ oil, the outstanding source of vitamin E, possesses me property whereby it may be helpful in the prevention of aboron but the subject is highly controversial, particularly in its appliition to human beings. Vogt-Møller has reported two series of) (1933) and 52 (1936) cases in which no anatomic or physiologic onormality could explain repeated abortion. Administration of a aily dose of 3 grams of purified wheat-germ oil resulted in the birth living children in 17 and 38 cases respectively (cited by Mattill, 939). Other authors have likewise reported varying degrees of iccess in the treatment of habitual abortion with vitamin-E prepations. The evidence thus far available, however, can hardly be onsidered sufficient to establish the human need for this factor.

The term "antisterility" is to a degree misleading since in experiental vitamin-E deficiency pathologic results occur which are otally unrelated to sterility or fertility; other tissues may require tamin E especially during periods of rapid growth. It is possible nat lack of vitamin E strikes directly at the nuclei of rapidly rowing cells producing irreversible damage in the structural frame-

work. Mason (1933) inclines to the view that this vitamin is intimately related to the behavior of the nucleus in cell division.

Nutritional muscular dystrophy and encephalomalacia in various animals has been studied for a decade by Goettsch and Pappenheimer. For these conditions α-tocopherol is specifically preventive and protective. The manifestation of vitamin-E deficiency seems to be different in each species studied. Furthermore, in any one group all or only a portion may develop the disease, some progressing rapidly, others slowly. Severe lesions may exist without symptoms. There are marked individual differences in the amount required for protection. Nutritional deficiency in the parents may not be manifest but paralysis may occur in their offspring due to advanced lesions of the skeletal muscles.

Einarson and Ringsted (1938) have described degenerative changes in the posterior spinal roots, posterior columns, anterior horns and pyramidal tracts in vitamin-E deficient rats, with consequent muscular dystrophy and atrophy. They have suggested the analogy of the lesions with human muscular dystrophies and clinical reports would indicate that in some of these degenerative conditions of unknown etiology vitamin-E therapy has led to improvement.

It is the opinion of Morgulis *et al.* (1938, 1939) that both the fat- and water-soluble fractions of wheat-germ are necessary to prevent nutritional muscular dystrophy. The specific agents necessary are held to be vitamin E and probably vitamin B_4.

According to Evans (1939) there is an established relationship between vitamin E and normality of the cross-striated (voluntary) musculature of the body. In the suckling young of experimental E-deficient animals, death often appears suddenly without premonitory signs and can be prevented by α-tocopherol. Degeneration also occurs in the walls of the vascular trunks supplying the brain in vitamin-E deficiency.

Alimentary exudative diathesis is also a consequence of E-avitaminosis (Dam and Glavind, 1939). This edema, largely subcutaneous, has no apparent connection with encephalomalacia. It is associated with a low-fat, protein-deficient diet. Less vitamin E is required to offset this condition than the cerebral disease.

The clinical investigation of vitamin-E therapy is in its infancy. This vitamin is being used in the treatment of muscular dystrophy, amyotrophic lateral sclerosis, peroneal muscular atrophy, amyotonia congenita, locomotor ataxia, and in infantile paralysis (Bicknell, 1940; Wechsler, 1940; and Stone, 1940). Some believe that the appearance of locomotor ataxia may be due to deficiency of vitamin E which is causing degeneration of nerve tracts already weakened by syphilis.

These newer studies which have immeasurably widened the sphere of vitamin-E activity render the term *antisterility vitamin* obsolete, since the neuromuscular function of this vitamin may prove to be of major importance. The view that the effects of vitamin-E deficiency are produced by hormonal imbalance is not supported by experimental evidence (Drummond, 1939).

Requirement.—There is no established unit for vitamin E, but s customary to express the potency of its sources in terms of the ans unit which is based upon the minimum requirement whereby rmal rat litters are obtained when the test dose is administered ring the first few days of gestation.

Nothing is known about the human requirement for vitamin E d, aside from such reports as Vogt-Møller's, there is little or no idence that vitamin-E deficiency is ever responsible for human rility. Further work on the relationship of vitamin E to the iscular dystrophies should help to clarify the subject.

Sources and Administration.—Dietary vitamin E is adversely fected by much lard or cod-liver oil. The potency of milk powder hich is stored in air for long periods diminishes, but this is not true storage in deoxygenated air (Supplee and Dow, 1925). Butter t contains vitamin E. Definite data as to the extent to which e human dietary may supply vitamin E are still lacking. So far is known, there is an abundance of this vitamin in natural ods. Since degerminated cereal products play an important part modern diets, the loss of this source of supply may perhaps be gnificant, as it is in the case of thiamin. Unless the supply of tamin E is more than adequate from other sources the possibility deficiency exists. With advances in our knowledge of this factor, order-line deficiencies may be discovered to be more common than present supposed.

The richest sources of vitamin E are green leaves and embryos of eds or oils therefrom (barley, corn, cottonseed, flax, hempseed, red alm, peanut, rice, soybean and wheat). Smaller amounts occur in t and muscle tissue, milk and eggs.

If it is desired to assure a high vitamin-E intake, the diet should e supplemented with wheat-germ. Capsules of wheat-germ oil are so available as a rich source of this factor. Since some of these reparations have been shown to be unstable and variable as to itamin-E potency, only those which have been tested for activity hould be used. According to Shute (1938) wheat-germ oil even if efrigerated to prevent deterioration is not reliable after eight weeks. table preparations of whole wheat-germ are preferable; 1 ounce of heat-germ furnishes about 3 grams of the oil. Defatted wheat-germ hould, of course, be avoided when vitamin E is required.

Wechsler and others have treated the neuromuscular atrophies nd dystrophies with synthetic α-tocopherol, with definite evience of improvement, using both oral and parenteral routes. But view of the impression that "vitamin E" may be actually a comex of multiple factors, it would seem preferable, when the synthetic reparation is used, to employ with it wheat-germ oil, or, better, heat-germ itself.

VITAMIN K.

Physical and Chemical Properties.—Dam's "Koagulations-vitain" (1935) has been chemically identified (1939) by two different roups of investigators (Doisy, Fieser). Active agents are 1, 4-

naphthoquinones or substances capable of yielding such quinones under biologic oxidation. Because of its oily character, vitamin K has not been used intravenously. Doisy, however, has produced water-soluble compounds equal in potency to vitamin K which are suitable for parenteral or oral therapy without bile salts.

Vitamin K occurs in the non-sterol fraction of the unsaponifiable fat and resembles vitamin E in solubility and resistance to heat (Osterberg, 1938). It is destroyed by alkalies and certain substances which bring about oxidation (Munsell, 1940). Although vitamin K is rapidly inactivated by light, whether natural or artificial, when dissolved in benzene, ethyl alcohol or acetone, crude alfalfa extracts are fairly stable toward light (MacQorquodale, 1939).

Physiologic Action and Deficiency Effects.—Vitamin K has been deemed essential for the synthesis of prothrombin. The mechanism whereby this vitamin increases the plasma prothrombin has not yet been elucidated. It seems to be definitely established that bile is required for the absorption of vitamin K. Desiccated bile produces better results than the prepared bile salts when administered in conjunction with vitamin-K concentrates.

The blood of the new-born does not clot readily and hemorrhagic disease is not uncommon. Although the prothrombin content of the plasma varies widely until the fifth day after birth, a low concentration is the rule and in some instances the blood is peculiarly deficient in prothrombin particularly between the ages of forty-eight and seventy-two hours. Intracranial hemorrhage not infrequently originates from even moderate trauma during delivery with disastrous consequences. The use of vitamin-K concentrates has been suggested for both mother and child to check such bleeding (Waddell and Guerry, 1939).

For the production and maintenance of vitamin-K levels in the body there are four requisites: a well-balanced diet, an adequate flow of bile, a functioning intestinal absorbing area, and a physiologically normal liver. Primary vitamin K deficiency probably is not common. Under ordinary conditions a nutritional deficiency would be slow in developing and would be easily corrected.

Biliary obstruction appears to result in failure of vitamin-K absorption with subsequent decrease in plasma prothrombin. The tendency to hemorrhage in jaundiced patients under operation is a matter of much concern. Vitamin K functions particularly well in the prevention of the slow oozing which is characteristic of cholemic bleeding.

Vitamin K has not been of benefit in hemorrhagic diathesis which is not associated with low-prothrombin levels in the blood.

Clinical Estimation of Deficiency.—Suitability of a patient for vitamin-K therapy is determined by the prothrombin clotting time of the blood by Quick's procedure (1936) or modifications by Smith *et al.* (1939). The latter is a bedside test which constitutes a practical measure of the tendency to bleed. "Bleeding time" and even "clotting time" as ordinarily determined do not provide a satis-

tory guide as to blood prothrombin content. Administration of amin K and bile products promptly (that is, within a day) ores the clotting activity (as judged by prothrombin clotting e) to normal levels.

Requirement.—No data are at hand for estimating the requirent of vitamin K. Its present use is restricted to therapeutic scriptions for abnormal conditions.

Sources and Administration.—The fat-soluble vitamin K occurs hog-liver and soybean oils, spinach, kale, carrot tops, cabbage, liflower, tomatoes and egg-yolk. The antihemorrhagic factor ich occurs in green leaves in large quantities apparently is not cted by withering or yellowing of the leaves. Flowers, roots and ds contain much less than green leaves (citation from Daniel, 0). Dried alfalfa leaf meal and putrefied sardine meal are good rces of this vitamin. Evidently it can be synthesized under terial action. Cod-liver oil, wheat-germ and wheat-germ oil do exert any antihemorrhagic effect. It is noteworthy that hough vitamin K can be derived from fish meal, it is not found in n-liver oils.

Rhoads recommends daily oral doses of 1 to 4 mg. of 2-methyl-1, aphthoquinone together with bile salts (either iron bile salts, to 2 grams, or sodium desoxycholate, 0.015 to 0.4 gram *per m*). Frank *et al.* use intravenously a 10-mg. dose of synthetic amin K_1 in obstructive jaundice to obtain normal clotting time thin four hours.

VITAMIN P

In 1936 Szent-Györgyi and his co-workers described a substance esent in extracts of paprika and lemon peel which tended to corct abnormally increased permeability of capillaries. To this subance or possibly group of substances, they gave the name "Vitamin ". A crystalline extract obtained from lemons was named "Cit-". The exact chemical nature of vitamin P is not known. Cit- is believed to contain the flavone dyes, hesperidin and eriodictyol icoside and has been shown to bring about a decrease in capillary rmeability. Another flavone glucoside, called Rutin, has been tained from tobacco and young flowering buckwheat. In its pure te, this substance has about 10 times the activity of crude hesridin. It has been demonstrated by Scarborough that patients, ffering from nutritional deficiencies in which a low capillary istance was present, improved following the administration of speridin or other vitamin P containing substances but did not prove with the administration of ascorbic acid. On the other nd, the ecchymosis and gingival hemorrhages of scurvy responded vitamin C but not to vitamin P. Scarborough concluded that specific manifestation of vitamin P deficiency is an increase in pillary permeability distinct from the increased capillary fragility ich is seen in scurvy in which there is actual rupture of the capary walls resulting in genuine hemorrhages. The former is corted by vitamin P but is unaffected by ascorbic acid while the

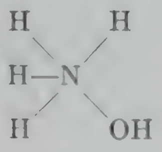
reverse is true of the latter. There is at present no satisfactory procedure for the determination of vitamin P deficiency. For clinical purposes use is made of the Rumpel-Leede phenomenon using positive pressure or the modified Hecht test using negative pressure.

There are numerous conditions in which increased capillary permeability may be found, including vitamin deficiencies, hypertention, purpura, toxic states and scurvy. At the present time clinical results obtained with the use of vitamin P substances leave much to be desired.

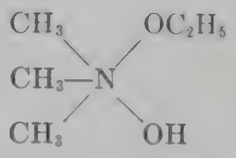
For therapeutic purposes where vitamin P is indicated, rutin may be employed in dosages from 20 to 60 mg. 3 or 4 times daily for several weeks.

CHOLINE

Choline is included among the factors of the vitamin B complex, although many investigators in the field feel that it is not a true vitamin substance, since symptoms of so called "choline deficiency" may, in fact, be due to a lack of methyl groups which choline may normally supply, but which can be derived in adequate quantities from other substances which also contain this radicle. Choline is a base, comparable in strength to sodium hydroxide, and may be considered structurally as a derivative of ammonium hydroxide in which three hydrogens have been replaced by methyl groups and the fourth hydrogen by an ethoxy radicle (C_2H_5O). Choline may thus be considered as ethanol-trimethyl-ammonium hydroxide. The following is its structural formula along with that of ammonium hydroxide:—



Ammonium Hydroxide



Ethanol-Trimethyl-
Ammonium Hydroxide
Choline

Choline forms part of the molecule of lecithin and sphingomyelin, both important phospholipids concerned in the cell structure of both plants and animals, so that choline containing substances are found widely distributed in nature. Some of the best sources are liver, wheat, egg yolk, milk, brain, heart, kidney and soybeans.

Most species of laboratory animals, fed a diet high in cholesterol or fat but low in choline and proteins, will develop fatty livers as well as hemorrhagic degeneration of the kidneys together with hemorrhage into the eyeballs and other organs. This is particularly true of weanlings whose need for methyl groups seems to be greater than that of older animals. Choline is concerned physiologically with the transport of fat from the liver through the formation of soluble phospholipids. It must be noted, however, that choline may be synthesized by the animal from methionine derived from

in, thus, symptoms of "choline deficiency" would at the same imply a deficiency of methionine. It appears, therefore, that nanifestations of "choline deficiency" are in fact due to a yl deficiency from any source rather than lack of choline .

the treatment of cirrhosis of the liver, where choline has been in conjunction with high protein, high carbohydrate diets along adequate vitamin supplements, improvement has been noted, n such cases improvement has also been found to occur even line is omitted from the routine. It is more than likely that ese instances the presence of methionine supplies the methyl s necessary for the synthesis of choline within the body. On ther hand Russakoff and Blumberg (1944) cited three cases showed no improvement on a high protein diet alone but ed distinct benefit within a week after instituting choline py. Choline chloride was given after meals in doses as high grams daily, one patient taking this amount for six months ut any untoward effect. Morrison (1946) was able to show raging results by the employment of a high protein, high hydrate, low fat diet along with the use of liver extract and ins. He gave his patients a combination of 2 grams of meth- e and 2 grams of choline daily. These substances were com- l in a capsule and given in divided doses. Cases in which ge liver (fatty infiltration) is demonstrated are apt to show vement, whereas those without liver enlargement (fibrosis) t show beneficial results.

VITAMIN INTER-RELATIONSHIPS AND ANTAGONISTS

is now well recognized that the fat soluble vitamins occur in s composed of homologous substances, all of which tend to the same physiologic effect in the organism. Thus we have wo vitamins A, several vitamins K, the three vitamins E and t ten sterides, all of which have vitamin D or antirachitic ity. In the B complex group, it is now recognized that pyrid- has two homologues, pyridoxal and pyridoxamine, both of exert physiologic effects similar to pyridoxine. Niacin also wo homologues, niacin amide and diethyl nicotinamide, which nstrate antipellagra activity. The various substances thus entioned which exert similar physiologic activity do so because all contain similar fundamental basic chemical structures, in some way are responsible for the activity of the compound. ther type of vitamin inter-relationship, however, is now well ished, although the necessary connecting link is not always ent. Illustrative of this type of inter-relationship should be oned the observation of Opper, that rats receiving large doses amin D, demonstrated arterial calcification which was not t in a group of control animals receiving the same dose of in D as well as a simultaneous dose of vitamin A. He thus

concluded that a lack of vitamin A may be responsible for the production of the vitamin D toxicity.

Holmes and Pigott, reported that rats on a vitamin E deficient diet could be improved by the administration of large doses of thiamin chloride while Milhorat and Bartels, demonstrated a synergistic action between inositol and vitamin E during the course of treating patients with muscular dystrophy. Davies and Moore noted also that rats on a diet deficient in both vitamins A and E used up their vitamin A reserves much more rapidly than controlled groups of rats on a vitamin A deficient diet who were receiving alpha tocopherol. Hickman, Harris and Woodside published the results of their investigations which demonstrated a pronounced synergistic effect between vitamins A and E.

Sure, Theis and Harrelson showed that rats deficient in vitamin A had a reduced vitamin C content of the heart, kidney and thymus while Boyer showed that vitamin A deficient rats excrete very much less vitamin C in the urine than rats who are not vitamin A deficient. It has been also shown that vitamin A deficient cattle cannot synthesize normal amounts of vitamin C. Sure, Theis and Harrelson also showed that in both thiamin and riboflavin deficiency, marked loss of vitamin C was noted in lung, kidney and liver tissue.

Supplee, Jensen, Bender and Kohlenberg showed that thiamin and panthothenic acid deficiency influenced the mobilization of riboflavin in the liver. Sure and Ford showed that an inter-relationship exists between thiamin and riboflavin. It appears that a thiamin deficiency results in poor riboflavin retention, thereby producing a multiple deficiency where only thiamin is deficient in the diet. As a corollary, it would seem that adequate thiamin intake would protect against both thiamin and riboflavin deficiency. Darby, Kaser and Jones (1947) showed that folic acid promotes the absorption of vitamin A and carotene in patients suffering from sprue.

Another type of relationship exists between vitamins, as well as between vitamins and non-vitamin substances. As an example of the former, Martin showed a reciprocal antagonism between para-aminobenzoic acid and inosotol, while an example of the latter is the well known antagonism between para-aminobenzoic acid and the sulphonamides. Woods and Fields explained this last phenomenon on the basis of structural similarity between sulphanilamide and para-aminobenzoic acid, making it possible for either of these substances to combine with an enzyme required by the bacterial cell for growth. It would seem that a competitive state exists when both these substances are present, during which the sulphanilamide has the edge resulting in the formation of an enzyme-sulphanilamide compound not utilized by the bacterial cell, instead of the enzyme-paraaminobenzoic acid combination which it requires for normal nutrition. It should be noted that the addition of an excess of paraaminobenzoic acid to the culture medium negated the effect of sulphanilamide to a large extent. It is of practical interest that the molecule of procaine includes a para-aminobenzoic acid grouping

h is split off in the body and will procdue an antisulphanilamide t. It would thus seem advisable to choose local anesthetics h do not contain the para-aminobenzoic acid group when ating upon patients requiring sulphanilamide therapy.

milar vitamin chemical antagonisms are now known to exist een thiamin and pyrithiamin; riboflavin and isoriboflavin; othenic acid and thiopanic acid; biotin and desbiotin; ascorbic and glucoascorbic acid, relationships which may ultimately me of importance in the developement of new antibiotic agents. lationship of present practical importance is that of vitamin the one hand and dicoumarol or salicylic acid on the other.

ISCOVERED VITAMINS: THE USE OF VITAMIN CONCENTRATES AND EXTRACTS.

is certain that still other accessory factors remain to be disred. A diet synthesized from highly purified preparations of h, protein, refined fat, mineral salts, and the known vitamins not maintain as good a rate of growth and development as one hich these substances are supplied by the natural foods; each factor, when added to such synthetic diets, has improved the th rate and condition of animals, but since a food rich in ssory factors, such as milk, wheat-germ or yeast, improves the still further it is evident that there are still missing elements.

is, therefore, not to be expected that a diet of refined foods be made complete by adding to it purified vitamin concentrates. rder to compensate for the unavoidable complement of devitazed foods in the modern diet, it is necessary to include foods h are especially rich in accessory factors, such as liver, egg-, cereal embryo, milk or yeast. Cereal germ has the advantages eing rich in accessory factors and requiring no cooking. The which contains meat, eggs, milk or cheese, butter, fresh fruits vegetables, and cereal germ or yeast is probably as nearly quate and complete as the human diet can be under modern litions of food production and distribution.

is necessary to bear in mind the distinction between highly entrated natural sources of the vitamins and the artificially pared extracts and concentrates. We have already referred to cal observations showing that cod-liver oil appears to have a e potent anti-rachitic action than viosterol. Viosterol and irraed foods have a definite use, when the need is known to be ricted to vitamin D alone and when natural sources are not well rated. The same is true of the vitamin B factors. The pure parations of these factors may be employed when for any reason parent foods from which they are derived cannot be given; they often of value in therapeutics, but for use in constructing an quate normal diet or for fortifying a therapeutic diet the proive foods themselves, when they can be given, are preferable.

Much work remains to be done before we shall be able to say certainty that any diet is satisfactory and complete in all

necessary nutritional factors; but *we already have sufficient knowled to bring about an immense improvement in general health and in t effectiveness of our own therapeutic measures.* Ignorance and povert are the two obstacles which stand in the way, and in combatin the former the physician stands in the front line. The clinicia interested in nutrition finds a large proportion of his patients eag to understand the relation between diet and health. If he wi make them understand the importance of the accessory factor in the maintenance of good health and nutrition, and show ther how to ensure an adequate intake of these factors in the diet, h can help to further the great improvement in public health whic modern nutritional knowledge makes possible.

SECTION IV.

CLASSIFICATION AND STRUCTURE OF FOODS.

DEFINITIONS.

utrition may be defined as the sum of all physical and chemical ions involved in the stimulation of growth and maintenance oper body function.

e term, *nutritive*, is frequently restricted to the caloric food ents.

ietetics is the practical application of the principles of nutrition oth health and disease.

oods are those substances which, when taken into the body, heat and energy, supply the elements for growth and replace- of worn-out tissue, or serve as metabolic regulators of proto- nic activity.

FOOD EQUIVALENTS.

hroughout this book, reference is constantly made to the term lorie." As taught in elementary physics, a calorie is that unt of heat necessary to raise the temperature of 1 cc. of water 0° to 1° C. In food chemistry a different type of heat unit is zed, called the "large Calorie" in contradistinction to the calorie described, which is termed the "small calorie." The "large rie" (food calorie) is the amount of heat necessary to raise 1 kg. 0 cc.) of water from 0° to 1° C. Based on this definition, the wing heat values have been determined:

1 gram carbohydrate yields	4.1 large Calories.
1 gram fat yields	9.3 large Calories.
1 gram protein yields	4.1 large Calories.
1 gram alcohol yields	7.0 large Calories.

is uncertain whether alcohol is uniquely thermogenic (that is, pated as heat) or is also available for physiologic work, spar- such nutrients as carbohydrates and fats. It is claimed by e that ethyl alcohol is not used as a source of oxidative energy nuscular activity. According to Mitchell (1935), the energy cohol is about three-fourths as available for physiologic pur- s as sucrose, the difference being attributed to the greater ific dynamic effect of alcohol.

CALORIC REQUIREMENTS.

review of the literature in reference to man's energic require- ts reveals many discrepancies. When it is considered that sex, weight, height, size (surface area), muscular activity, body perature, brain activity, together with climate, environmental litions, etc., alter the requirements, it may readily be seen no one formula can be applied to the feeding of the human nanism.

In spite of the presence of all these variables, some standar must be established in order intelligently to feed the sick or we The consensus of opinion as to food requirements expressed in th amounts of carbohydrate, protein and fat required by the averag person *per diem* is: Carbohydrates, 350 grams; proteins, 100 gram fats, 150 grams; totaling about 3200 Calories. This energic requir ment is estimated as being necessary for the average working mar Each of these components has been the subject of much divergenc of opinion. Recently, an analysis of large groups of non-dietin individuals revealed that the total protein intake *per diem* wa closer to 50 than to 100 grams. Booher (1940), however, has stresse the fact that cost is an important deterrent in securing a highe protein intake. As a rule, wage earners *prefer* a diet which provide 110 to 120 grams of protein daily. McCollum (1939) likewis places the adult requirement at this level.

It is estimated that the adult needs:

At rest,	20 to 30 Calories per kilogram
For light exercise,	30 to 40 Calories per kilogram
For moderate exertion,	40 to 45 Calories per kilogram
For heavy labor,	45 to 75 Calories per kilogram

Roughly, this amounts to 10 to 35 Calories per pound, the weight representing the ideal rather than the actual.

For certain purposes, it may be simpler to compute the twenty-four-hour requirement for rest, then to add to it

For light exercise,	50 to 75 Calories per hour of work
For moderate exertion,	75 to 150 Calories per hour of work
For heavy labor,	150 to 300 Calories per hour of work

Calculations such as the foregoing are altered during illness. This is especially true in pyrexia. In the presence of a fever (particularly of long duration) the more modern view has been to increase the daily caloric intake over the calculated requirement, in order to maintain body nutrition. In fevers of short duration, it is accepted as good practice to institute a subnormal caloric diet during the more acute period. Careful studies of 500 diabetics have convinced Rabinowitch (1938) that health may be maintained with much smaller amounts of food than are indicated by current standards.

Number of Meals per Day.—Booher (1940) has raised the question of the desirability of changing from the three-meal system to five meals a day. Sufficient experimental evidence has been obtained to warrant acceptance of the fact that workers are relieved of a feeling of fatigue, irritability and muscular inefficiency by mid-morning and mid-afternoon meals. A well-balanced diet distributed throughout the day is conducive to industrial efficiency and better spirits as judged by investigations of large groups of employees. This constitutes application to normal individuals of a principle long recognized as sound for the peptic ulcer patient, the invalid and the convalescent.

CHEMICAL CONSTITUTION.

oods, in general, may be grouped into two classes: those which nutritive, that is, supply heat and energy to the body, and those h are non-nutritive, providing *per se* no energy and necessary, me instances, only in infinitesimal amounts for the proper main-nce of body function. The former consist of the carbohydrates, eins, and fats. The latter include water, mineral salts, and nins.

arbohydrates.—The simple carbohydrates fall into two main ps: (1) Sweet, crystalline compounds soluble in water, such ugars (their chemical names terminating in -ose); and (2) eless, non-crystalline substances relatively insoluble in water, as starch, glycogen, dextrin, and inulin. The carbohydrates polyhydric alcohols with free or potential aldehyde or ketone ps, the insoluble ones being anhydrides of the sugars.

he irritant effect of concentrated sugars has been attributed to r solubility. Excessive sweetness also leads to gastric upset. ose, which is less soluble than other common sugars and the sweet, may be substituted with therapeutic benefit for the e irritating sugars. Relative sweetness has been determined Biester *et al.* (1925). Compared to sucrose (designated as 100) r sugars rate as follows:

Fructose	173.3	Maltose	32.5
Invert sugar	130.0	Galactose	32.1
Glucose	74.3	Raffinose	22.6
Xylose	40.0	Lactose	16.0

efined carbohydrates have less real food value than those in natural state. This is partly due to the loss of minerals and accessories, of whose nature we know little, and partly to the tion of deleterious substances in the manufacturing process.

arbohydrates function in two ways in their relation to fats. riable amount of sugar is changed into fat and stored as such; tendency to fat formation is dependent upon individual heredi- forces. Glucose undergoing oxidation acts as a catalyst for combustion of fats. Without the aid of sugar, fatty acids pro- to degradation products containing four carbon atoms. If ose is not being burned, the four-carbon residues, instead of g oxidized to CO_2 and H_2O, accumulate and cause acidosis.

uch light has been thrown on the relationship between carbo-rate and protein metabolism by the experiments of Cuthbertson Munro (1939). It has been demonstrated on 4 human subjects when the protein and the carbohydrate moieties of an adequate are separately ingested over short periods of time, there is a tive N balance of some 2 grams daily (mainly urea). This loss be spared if the carbohydrate and protein are ingested together. produce this sparing effect requires the *close approximation of*

the protein to the carbohydrate, but the nitrogen spared is not necessarily proportional to the amount of carbohydrate present along with the protein. There are two separate aspects to the relationship between carbohydrate and protein: (1) The N-sparing effect of the adequate carbohydrate diet, and (2) the N-saving effect of the surfeit carbohydrate diet. The latter differs from the former in that carbohydrate in excess of energy requirements *ingested at any period of the day* is capable in the long run of causing storage of nitrogen and the nitrogen stored is roughly proportional to the amount of surfeit carbohydrate taken. One possible explanation for this behavior involves a special inhibitory action of carbohydrate on the deaminases which operates to prevent loss of amino-acids.

Requirement.—Carbohydrates are the chief source of energy in the body. The average daily requirement is 350 to 500 grams. The lowest intake consistent with continued health has not been experimentally determined, but even in diabetics it is not wise to reduce the carbohydrate intake to less than 100 grams per day for any length of time. The employment of 600-Calorie diets in treating obesity may call for as little as 35 grams of carbohydrate daily, but such a regimen should not be undertaken without supervision. The carbohydrate minimum may be placed at 0.6 gram per kilogram for those who are overweight.

Depending upon individual energy requirements, taste and climate, the proportions of the calories derived from carbohydrates will vary from 45 to 75 per cent. In the average diet the carbohydrates contribute 60 to 70 per cent of the total caloric value.

Deficiency.—The ability of the body to store carbohydrates is limited. The liver serves as the general reservoir for such carbohydrates. It is continually tapped to maintain the normal blood-sugar level. Muscle glycogen is reserved for the use of that particular tissue. Reducing diets deplete the supply of liver glycogen and may lay this organ open to irreparable damage. Carbohydrate deficiency leads to acidosis, listlessness, fatigue, lack of resistance and emotional irritability.

Sources.—Glucose is especially plentiful in grapes, young sweet corn, and onions. Young sugar cane contains glucose, fructose, and sucrose in about equal quantities, but the fructose decreases to a trace as the plant matures. Honey is essentially invert sugar (equal amounts of glucose and fructose), although both sucrose and dextrin are present. Fructose occurs in many fruit juices. Its concentration in the tomato and mango is noteworthy. Sucrose is found in most sweet fruits together with glucose and fructose. It is especially abundant in the juice of the cultivated sugar beet, sorghum and sugar cane, and in the sap of the sugar maple. According to Sherman (1935) sucrose has been reported as constituting at least one-half the solid matter of pineapples and of carrots. The physiologic fate of raffinose, a trisaccharide occurring in sugar-beet molasses, is unknown.

latherwick *et al.* (1940) have reported that d-mannoheptulose ears in the urine of normal persons after eating avocado. This ır may occur in concentrations high enough to give a "positive" on reduction of the commonly used reagents. Only a small tion of the ingested sugar is accounted for by urinary excretion.

entoses are present in yeast, plums, prunes, grapes, and cherries. nutritive value of xylose and rhamnose is not known, but it is ible that ribose is utilized in the formation of body nucleic s. Physiologic oxidation of these sugars to CO_2 and H_2O is ly questionable.

nulin, the polysaccharide which is hydrolyzed to fructose, is nd in chicory, French and Jerusalem artichokes, salsify, and ble burdock root (Japanese *gobo*). During storage "inulin" aks down with the formation of substances hydrolyzable by ertase. True inulin probably is not an available carbohydrate man (McCance, 1936).

lycogen occurs in animal tissues, particularly in the liver and scles. In the assembly of data on the composition of meat, ltry and fish, analysts have regarded the small amount (usually ut 1 per cent) of glycogen in muscle as negligible compared to protein and fat concentrations. The amount of glycogen is apt be exceedingly variable, but its presence should not be ignored. e mollusks are noteworthy for their glycogen content (3 to 5 per t).

Dextrin occurs in natural and germinating grains, although the ef carbohydrate is starch which may amount to more than -half of the total solids. Bananas, chestnuts, and potatoes are ticularly rich in starch.

Not all carbohydrates can be utilized for energy purposes. cise knowledge regarding many of the plant polysaccharides is king. Crude fiber or cellulose is untouched by the human diges- e system. Agar agar is hydrolyzed only to a very limited extent. ntosans disappear from the intestinal tract, the evidence favoring orption rather than bacterial attack. The fate of the pentose ars is debatable. Unassimilable carbohydrates included in the t to give bulk and to promote regular peristalsis are, of course, hout caloric value. Sugars, especially lactose, are frequently scribed for the bacterial flora of the colon rather than as fuel for host. Where sugar serves as a substrate for bacterial action, fer- ntation occurs, the formation of such acids as acetic and butyric oring alimentary evacuation.

Analyses of foods which include fiber under carbohydrate may be olly misleading as to caloric value. Starch, particularly, in the state may be trapped within cellulose walls and so escape estion. Even sugars may not be utilized by the body because heir carbon configuration. Only a very few experiments have n performed to ascertain the "available" carbohydrate content oods.

Unavailable Carbohydrates.—Attention is directed particularly ellulose or crude fiber and to the hemicelluloses which include

the hexopentosans or pectins. On hydrolysis the latter yield both hexose (as galactose) and pentose (as arabinose) as well as galacturonic acid. The pectins must be classed with the colloidal carbohydrates because of their absorptive capacity for water. It is this property which is utilized in treating both diarrhea and constipation (see pp. 138 and 140).

In healthy men, Cowgill and Sullivan (1933) have demonstrated a quantitative relationship between the fiber content of the diet and the degree of laxation. They have placed the physiologic minimum at a daily allowance of 90 to 100 mg. of fiber per kilogram of body weight. In constipation, however, fiber in the diet may undergo decomposition during passage of the alimentary tract and so fail to function in the mechanical stimulation necessary for evacuation. There appears to be marked variation in individual ability to render crude fiber inert in the colon. As a consequence, it may become necessary to prescribe fiber which is resistant to bacterial attack. Commercial bran and, to a lesser extent, processed bran products meet this demand. The average person requires merely an adequate quantity of roughage in the form of vegetables, fruits, and cereals together with a certain amount of fat and plenty of fluid to secure normal removal of intestinal wastes. Those who harbor strains of bacteria capable of disintegrating mixed plant fiber require variable supplements of wheat bran. Where the colon is narrowed, ulcerated or highly irritable, bran is contraindicated and bland diets together with pectins are in order.

Although as much as 50 per cent of the "unavailable" carbohydrate of vegetables and fruits may fail to be excreted in the feces, there is no evidence that glucose is derived therefrom. These polysaccharides are, therefore, best regarded as without caloric value. Their disappearance, however, makes it impractical to depend upon them to furnish intestinal "roughage."

Proteins.—Proteins are the most important of the foodstuffs. Certain animals can subsist on a protein diet, forming from the protein such fat and carbohydrate as they require. The chemical instability and complexity of the proteins are essential for the phenomena of life, since protoplasm is fabricated from these compounds. The proteins differ from the fats and carbohydrates in that they contain nitrogen (in amounts varying from 15 to 17.6 per cent.) The vegetable proteins contain slightly more, the animal proteins slightly less than the average 16 per cent. Sulfur (0.3 to 2.4 per cent) is usually found in the protein molecule and occasionally phosphorus (0.4 to 0.8 per cent). In 100 grams of mixed protein an average of 1 gram of combined sulfur will be found. Other elements, such as iron and iodine, though rarely exceeding 1 per cent, occur in specialized proteins. Iron is an important constituent of hemoglobin, while iodine is an essential component of a protein derivative in the thyroid gland. Iodine is especially common in marine proteins, particularly in the crustaceans and mollusks.

The simple proteins are naturally-occurring substances which on drolysis yield α-amino-acids which are crystalloids, most of m being readily soluble in aqueous media. This distinguishes m from the more complex proteins, which are colloids, slightly ible, if soluble at all, with huge non-diffusible molecules. Prons vary widely in their amino-acid content, some being composed only a few of the twenty-two known amino-acids, others contain- a great variety. Many of these acids can be manufactured by body; others must be furnished in the diet and are referred to "essential." Nine or ten of the amino-acids cannot be elaborated all or fast enough to meet the physiologic need. These include less well-known members of the family, *viz.*, methionine and hreonine. Not only must the "essential" amino-acids be availle in the diet, but they must be present in optimum proportions, h the result that some proteins are found to be "adequate," while hers fail to sustain body weight or provide for growth. The quality the dietary protein is as important as the quantity and becomes reasingly so as the quantity is decreased.

Requirement.—The minimum subsistence requirement *per diem* s between 0.5 and 0.7 gram of selected proteins per kilogram of dy weight. It is probably safer to regard 1 gram as a minimum cause of the inadequacy of certain proteins and the unassimilable ture of part of the food nitrogen. Bed-ridden patients need less an 1 gram of protein per kilogram. If low-protein diets are indited, two-thirds of the nitrogen should be in the form of animal oteins. According to Sherman, cereal proteins are as efficient as eat proteins, provided milk is included in the dietary. In general, getable proteins lack the availability of animal proteins. If both otein and caloric intake are to be limited, skill is necessary in mputing a diet which is physiologically satisfactory; otherwise, ere will be considerable protein wastage. During the period of tive growth the protein allowance should be 2 to 4 grams per ogram per day.

Deficiency.—Low-protein intake over a period of time leads to proper physiologic distribution of water of which edema is the nical manifestation. There is a drop in the heat production, sue wastage occurs and anemia results from such protein defincy. Where the proteins ingested fail to provide certain aminoids, the elaboration of special agents, such as thyroxin, becomes ficult; this is evident in certain endocrine disturbances.

Sources.—Animal proteins (meat, fish, eggs, cheese, milk) are ually ranked higher than those of plant origin (cereals, nuts, umes). Neither maximum nor minimum proportions of these o groups have ever been established. Traditional preference and onomic necessity have largely determined selection. Until better dance is available, it is suggested that diets indigenous to the ality be followed, provided they are associated with physical gor. In temperate climates the cereals usually are not an adeate source of protein unless accompanied by generous amounts dairy products. Booher (1940) recommends that the average

adult select his protein in equal quantity from animal and vegetable sources.

As stressed by Nixon (1938) potatoes are a better crop than wheat from the economic standpoint, since an acre planted with the former will feed twice as many people as one planted with the latter. Although the potato is predominantly a carbohydrate food, tuberin (a globulin) is ranked as a protein superior to those found in the cereals. A liberal amount of potatoes in the diet is preferable to its equivalent in cereals.

The legumes or pulses generally furnish the cheapest source of protein. Although laborers may digest a pound of baked beans per day without discomfort, persons of sedentary habits cannot handle large quantities of leguminous foods (Bailey, 1928). Lentils are supposedly the easiest of the group to digest. Peanut butter is more readily utilized than peanuts ingested as such unless mastication is thorough.

Purins.—Simple protein combines with nuclein to form the nucleoproteins, most widely distributed of the conjugated proteins. The simple protein is hydrolyzed in the body to amino-acids which ultimately become urea, the chief excretory product of protein metabolism. Nuclein, however, is converted into uric acid, a trioxypurin. Foods which contain nucleic acids (and hence the purin ring) are designated as purin foods.

Since uric acid is associated with several pathologic conditions, dietary control of its source may become necessary. High-protein and carbohydrate-rich diets aid in the excretion of exogenous and endogenous uric acid. A high-fat diet and ketogenesis lead to retention of this acid. Uric acid is not only produced within the body by cellular activity (*e. g.*, the elaboration of digestive juices) but is also destroyed, the latter process depending upon the character and quantity of non-purins in the diet.

Requirement.—The body does not require preformed purins in the diet. The infant subsists for many months without dietary purins, yet encounters no difficulty in the synthesis of necessary nucleic acids. Ordinarily the adult ingests daily about 0.2 gram of nitrogen in the form of purins. This amount may be considerably lowered without any ill-effect being noted. It may be increased threefold without apparent harm to normal individuals.

Sources.—All animal foods except milk, cheese and eggs contain purins. Glandular organs are exceedingly rich in nuclein. It is doubtful whether the methylated purins (caffeine, theobromine and theophylline) are a source of uric acid in the body. The increased uric acid excretion noted after caffeine administration may be due to increased renal activity rather than to formation of uric acid from the caffeine.

Fats.—Fats and related substances, known collectively as the lipoids, are widely distributed in living structures. Tissue fats differ from storage fats in three important particulars: the fatty acids are more unsaturated, they suffer no diminution except in

extremes of starvation, they are linked with cholesterol or osphoric acid instead of glycerol.

The physiologic value of the lipoids depends upon their individual racter. Certain of the lipoids are as essential in the structure protoplasm as the proteins. In these tissue lipoids are found ups containing nitrogen or nitrogen and phosphorus. The tral or true fats are glycerides composed only of carbon, hydro- and oxygen, in the form of fatty acids linked to glycerol. The tral fats are heat insulators; they exercise a cushioning effect by eloping vital organs; they are the most compact form of stored ergy. Carbohydrates and proteins, when stored (and storage ce is limited), retain at least 3 parts of water. Fats are not only posited without water, but have about nine times the calorific lue of stored proteins or glycogen.

Fats are not utilized as readily as carbohydrates or proteins. probable preliminary step in the metabolism of fats is the removal hydrogen from the fatty acids to render them unsaturated and re unstable. With few exceptions, natural fatty acids are com- sed of long chains with an even number of carbon atoms. They believed to undergo β-oxidation, that is, carbon atoms are split from the acid end two at a time. The acetic acid so produced is dized to CO_2 and H_2O. This process continues until an acid with r carbon atoms is reached. Oxidation proceeds with difficulty ereafter unless glucose is being burned coincidentally. The cumulation of these four-carbon acids depletes the blood's supply sodium bicarbonate and acidosis results. In reduction of weight ere combustion of body fat is sought, a high-protein diet permits e use of much less carbohydrate without development of ketosis.

There is abundant proof that carbohydrates are converted into s. There is much less tendency for protein residues to be used in is way.

The metabolism of fatty acids is inseparably bound with choles- rol and the phosphorized fats (lecithins) which are found in all ing cells. Normally there is little transportation of neutral fat, such, in the blood. The fatty acids are carried largely in the m of lecithin, a highly advantageous arrangement, since lecithin, like neutral fat, mixes with water to form permanent emulsions a sort which can penetrate cell walls. It is probable that initia- n of fat oxidation is dependent upon the formation of lecithin. th lecithin and cholesterol enter into the structural framework of otoplasm.

Requirement.—Since adequate experimental data are not avail- le, it is difficult to fix a safe lower limit for fat ingestion. In the eatment of obesity, where diets of 600 to 900 Calories are em- oyed, the fat may be restricted to 20 to 25 grams a day. A well- lanced 2500-Calorie diet allows 50 grams of fat daily, amounting about 18 per cent of the total caloric intake. The average 00-Calorie diet will contain about 100 grams of fat, approximately per cent of the total calories. For sustained heavy labor fats

offer a better source of energy than the carbohydrates. The latter provide a cheap supply of quick energy.

Fats are essential in the diet as carriers of minute quantities of material of vitamin-like character. Special properties are bound with the unsaturated fatty acids; these are found quite generally in animal tissues. Linolenic acid is among the unsaturated groups found in fat from avian sources (chicken, duck, goose, turkey).

Deficiency.—Animals placed on a fat-free diet fail to show maximum growth and develop skin abnormalities. Excessive skin dryness in human beings can often traced to a low-fat diet. Inadequate intake of fats is accompanied by deficiency in the natural, fat-soluble vitamins. Since the carbohydrate reserves are limited, a fair storage of fats is desirable to meet satisfactorily the emergencies of life. The protective cushioning effect of storage fat and its heat-insulating qualities are not lightly to be cast aside if full vigor and health are to be achieved.

Sources.—Butter and cream are the most palatable and assimilable source of fats as well as carriers of vitamin A. Nuts, cocoa butter, vegetable oils, lard, and bacon, while rich in fat, are poor in vitamin A. Excessive dietary fat which does not carry vitamins may lead to loss of vitamin A.

The avocado (alligator pear) and the olive are outstanding exceptions among the fruits and vegetables in that their fat content is appreciable.

With few exceptions, analysis of food for fat involves ether extraction, evaporation and weighing of the residue. This weight includes all substances soluble in ether, such as cholesterol, together with actual contaminating matter. A second extraction removes the latter, but injudicious exposure of the "fat" to oxygen leads to changes in its composition with increase in weight. The factor 9.3 per gram is not applicable to all of this fat for determining its caloric value but meets a practical need.

TABLE 3.—**Functions of Carbohydrate Foods.**

Fate in the Alimentary Tract	*Metabolic Behavior*
Polysaccharides.	
Pectin (fruit jellies), probably not digested	Presumably not absorbed
Pentosans, undigested by enzymes, possibly hydrolyzed in part by bacterial action;	Pentose apparently not utilized by the body; excreted in the urine
Galactans (carrageen, agar-agar), not affected by enzymes	Not absorbed
Cellulose, not subject to enzyme digestion but may be altered by bacterial action; young and tender cellulose (hemicellulose of cabbage and lettuce) may be hydrolyzed to glucose	
Inulin, hydrolyzed to fructose	Absorbed and converted into glucose

TABLE 3.—**Functions of Carbohydrate Foods.** (*Continued.*)

rch / *trin* / *cogen* } Digested to glucose	*Glucose:* *Usual metabolic changes:* (1)oxidation to CO_2 and H_2O for immediate energy; (2) conversion into glycogen in the liver for providing a readily-available supply of carbohydrate; (3) storage as glycogen in the muscles for reserve energy. *Special metabolic paths:* (1) Conversion to galactose for formation of cerebrosides; (2) conversion to galactose for synthesis of lactose; (3) oxidation to glycuronic acid for detoxication purposes
charides.	
rose, split into glucose and fruc-ose	
ltose, hydrolyzed to glucose	
tose, split into glucose and galac-ose	
amelized sugars, undergo no hanges (?)	Excreted as reducing material in the urine
saccharides.	
ntoses / *ictose* / *cose* } require no digestion	Pentoses excreted by the kidneys. Excess glucose is excreted in the urine

TABLE 4.—**Functions of Dietary Fat.**

Fate in the Alimentary Tract	*Metabolic Behavior*
rides.	
utral fats, hydrolyzed to glycerol nd fatty acids	Resynthesized on absorption; glycerol is metabolized as though it were a carbohydrate. Neutral fat is stored as reserve energy, is used as insulation against heat loss, and exercises a cushioning effect by enveloping vital organs
ty acids, digestion not required; unction as laxative agents in the olon	Fatty acids undergo β-oxidation to CO_2 and H_2O provided there is simultaneous combustion of glucose
xes, not affected by lipolytic nzymes	Of no apparent value of the body

Fate in the Alimentary Tract	*Metabolic Behavior*
r Lipids.	
olesterol / *ospholipids* } Alimentary changes uncertain	Destruction and synthesis within the body not well understood. This type of "fat" is not primarily a source of energy. Cholesterol and lecithin (phospholipid) enter into the structural framework of protoplasm constituting "tissue" fat as opposed to "storage" fat (glycerides)
nt sterols, probably not absorbed rom the intestinal tract	

TABLE 5.—**Functions of Protein Foods.**

Fate in the Alimentary Tract	*Metabolic Behavior*
Conjugated Proteins.	
Nucleoprotein, separated into protein and nucleotides which are hydrolyzed either in the gastro-intestinal tract or within the body to H_3PO_4, glucose, purin and pyrimidine bases	Uric acid is the end-product of purin metabolism. The body can synthesize all the nucleoprotein it requires even on a purin-free diet
Lecithoprotein, separated into protein and a lipid moiety	Lipids follow the course of fat metabolism
Glycoprotein, separated into protein and a carbohydrate fraction	Carbohydrates are utilized as glucose
Phosphoprotein, separated into protein and a phosphorus-containing prosthetic group	Phosphorus compounds play vital rôles in the metabolism of proteins, carbohydrates and fats. Phosphate is the chief anion of osseous tissue and is vital in acid-base regulation
Chromprotein, separated into protein and a color-bearing group (N.B.—The fate of the various non-protein groups has not been definitely established)	Pyrrol groups, if present, are conserved for body synthesis of hemoglobin
Simple Proteins	
Albumin, *Globulin*, *Other proteins*: Hydrolyzed to constituent amino-acids (*e. g.*, glycine, alanine, tyrosine, tryptophan, histidine, arginine, cystine, leucine, and glutamic acid)	Amino-acids: (1) repair, maintain, or build new protoplasm; (2) are synthesized into endocrine agents (*e. g.*, thyroxin, adrenalin); (3) undergo deaminization when present in excess of immediate requirement (there is no physiologic provision for protein storage). The amino group is converted into urea and excreted by the kidneys. The hydroxy-acid remnant is treated as carbohydrate

Cholesterol.—Cholesterol is a lipoid of paramount importance. It is a vital constituent of nerve tissue, and is anti-hemolytic. It checks lipolytic action in the tissue cells, and is responsible in part for the semi-solid consistency of living cells despite their large water content (75 to 85 per cent). Increase in cholesterol concentration enables cells to hold greater quantities of water, pathologically visible as edema. Cholesterol (possibly better designated as animal sterol) is a high-molecular weight, monatomic, unsaturated alcohol of low specific gravity. Its complex structure relates it to the terpenes. It is a comparatively inert solid insoluble in water, but soluble in alcohol, ether, and chloroform.

Requirement.—Little is known regarding the origin, functions, and fate of cholesterol. Undoubtedly it can be synthesized in the body. Continuous feeding of diets high or low in fat raises or low-

rs the blood-cholesterol level, which is normally 0.18 per cent. he necessity for the inclusion of cholesterol in the diet is not nderstood, except that the sterols are related to vitamins D and E. holesterol or its derivatives located in the skin are transformed nto active vitamin D by solar irradiation. The infant receives ery little cholesterol from milk, but the diet is usually fortified with od-liver oil which contains related sterols.

Deficiency.—No data are available on the sequelæ attendant upon n inadequate supply of cholesterol *per se.* The desirability of ncluding eggs in the diet, particularly of children and convalescents, nay be due not entirely to their concentrated food value, but also o their high cholesterol content. Diets which are deficient in holesterol-containing foods are usually inadequate.

Sources.—The exogenous source of cholesterol is animal fat, lant sterols not being absorbed from the alimentary tract to any ppreciable extent.

Inorganic Salts or Minerals.—When plant or animal tissue is so eated as to remove all organic matter, the minerals are left behind s ash. This residue gives no clue to the form in which the elenents contained therein occurred in the tissue. The functions of he "mineral elements" are legion. Calcium and magnesium as hosphate and carbonate are the chief inorganic constituents of one and teeth with fluoride and silicon playing minor rôles. One f the essential elements of organic compounds composing the soft issues is potassium. Soluble and ionized salts act as physiologic atalyzers; they govern the condition of the body colloids and the novement of fluid; they affect the elasticity of muscle and the rritability of nerve; they produce and control the reaction of secreions. Increase in sodium or decrease in calcium in the surrounding luid augments the irritability of the tissue. Sodium, potassium, and calcium concentrations are kept at fixed proportions for the naintenance of physico-chemical phenomena, such as the rhythmic eating of the heart. Ionic imbalance leads to altered permeability f membranes permitting escape of protein, or to retention of salt with consequent water-logging of the tissues. Not only the absoute concentrations of the inorganic elements, but also their ratios re of paramount importance to the proper function of the body.

Trace Elements.—As pointed out by Underwood (1940) thirteen nineral elements are known to be essential to animal life, *viz.*, Ca, P, Mg, Na, K, Cl, S, Fe, Cu, Mn, Zn, I, and Co. The last five of hese are usually referred to as "trace elements." Because of its *elatively* large daily requirement, iron is no longer placed in this ategory.

Chlorides.—The chlorides constitute a relatively large proportion f body minerals. The adult is estimated by Sherman to contain bout 100 grams of NaCl (weight in grams $\times$ 0.0015). Despite the xtensive shifting of chlorides within the body, the blood concenration remains fairly constant at 0.45 to 0.5 per cent (measured s NaCl). Chlorides play an essential part in maintenance of

8

osmotic equilibrium, water balance, and acid-base adjustment. Digestion requires the diversion of appreciable amounts of chlorides as HCl from the blood and tissues to the stomach. Loss of this halogen from the gastro-intestinal tract (either through vomiting or diarrhea) leads to serious depletion since there is little or no storage of chlorides.

A moderate variation in chloride intake produces no immediate, significant effect upon metabolism. Diminished cell chlorides associated with a drop in water content result from a decreased dietary supply of salt. Excessive quantities of salt in the ingesta interfere with absorption and utilization of food, protein catabolism in particular being stimulated. Chloride retention is accompanied by an increased water content of the tissues as may be observed in generalized edema. Approximately 1 liter of water is held in the tissues for every 6 to 7 grams of NaCl retained. Ingestion of unusually large amounts of salt has been reported to have caused death.

Requirement.—Two grams of NaCl presumably represent the minimum daily requirement, although vegetarians require perhaps twice that amount. On a mixed diet the salt intake varies with the protein ingested. The average daily consumption of NaCl is 10 grams. Many persons, however, obtain 15 to 20 grams of salt per day. On a "salt-free" diet, the body may conserve Cl by excreting less than 200 mg. of NaCl in twenty-four hours through the kidneys.

With profuse sweating the loss of chlorides must be made good by increased dietary intake. Booher has calculated that a man laboring under conditions conducive to profuse sweating may lose 8 to 9 liters of water through this channel in a working day. If the sweat is of high salinity, the loss may amount to as much as 30 grams of sodium chloride. During acclimation to high temperatures, the salt concentration diminishes after the first few days to about one-half of the initial value. It is particularly important, therefore, that new workers be provided with adequate amounts of salt drinking water. A 0.1 per cent solution of sodium chloride in water at approximately 46° F. has been successfully used as a prophylactic for "heat cramps."

Deficiency.—Normal growth will not occur with radical reduction in the dietary chlorides. Salt-low diets may lead to asthenia and disturbances in water metabolism.

Sources.—It is customary to report chloride analyses in terms of NaCl. Since the chlorine may be combined with sodium, potassium, calcium, magnesium, and other elements occurring in traces, this may lead to absurdities. For example, molasses is very high in potassium (1.349 per cent) and low in sodium (0.019 per cent); yet its chlorine content (0.317 per cent) includes it among foods high in NaCl. The data, therefore, presented in the last column of Table 71, Mineral Constituents of Various Foods (page 775), must be taken with the proverbial grain of salt.

Under "Foods Highest in Chlorides" are found several noteworthy items, such as "salt-free" butter and "salt-free" white bread. Although the greater part of dietary chlorides is furnished as added NaCl, the halogen does occur in natural foods. Despite the presence of appreciable amounts of chlorides in the vegetable foods listed, the addition of salt is required for palatability, as explained later.

Sodium and Potassium.—Sodium is the predominating cation in body fluids (Na:K, 15:1, except in milk), potassium in muscle fibers and red blood cells. Potassium cannot be substituted for sodium in the diet. An abnormal excess of potassium robs the body of its sodium by causing its excretion as NaCl. Little disturbance in the Na:K ratio is tolerated. Growth ceases if potassium salts are withheld. Normal diets provide ample potassium. In plants there is an excess of potassium over sodium, rendering many of them unpalatable unless sodium chloride is added. The potato is a particularly good example of this.

To quote from McCance, Widdowson, and Shackleton: Potassium is the predominant metallic radicle in vegetable cells, and it forms a large part of the total minerals in plants. It is readily dissolved out in hot water so that vegetables which have been cooked for some time may have lost more than half their original potassium. Apart from dried pulses, vegetables with notably large amounts of this element are potatoes, mushrooms, horseradish and spinach. More potassium is found in carrageen moss than in any other vegetable which has been analyzed. There is a striking difference between the amount of potassium found in old and new carrots.

Vegetables contain only a very small amount of sodium unless it is added in the form of chloride or bicarbonate. Fresh fruits contain about 2 mg. Na per 100 grams whereas the potassium content usually exceeds 100 mg. In dried fruits values from 700 to 1900 mg. per cent are encountered. The amount of sodium in nuts rarely reaches 10 mg. per cent while the potassium concentration varies from 300 to 950 mg.

Experiments on 150 American dietaries (Sherman) revealed ingestion of 1.43 to 6.54 (average, 3.39) grams of potassium daily. The sodium intake is a variable factor due to individual preferences for much or little added salt, but averages 4.6 grams.

Calcium and Phosphorus.—The predominating cation in osseous tissue is calcium which constitutes about 1.5 per cent of the body weight. Calcium metabolism cannot be considered apart from that of phosphorus. Calcium phosphate and carbonate comprise 95 per cent of bone ash. Ninety-nine per cent of the total body calcium is in the bones and teeth. The remainder exists as soluble salts in the fluids and soft tissues. Calcium is necessary for the clotting of blood. (The serum averages 10 mg. Ca per 100 cc.). The excitability of the neuromuscular system is dependent upon the relative amounts of various cations in the body fluids and, in particular,

upon the concentration of ionic calcium. Calcium and vitamin C are required to maintain the cohesive properties of cells. Calcium exerts a favorable effect upon iron utilization; an abundance of calcium enables the body to subsist on subminimal amounts of iron.

All phosphorus occurs in the body as orthophosphate. It is ingested as inorganic salts, phosphoproteins (*e. g.*, casein in milk and ovovitellin in egg-yolk), nucleoproteins, phospholipins, and phytins (plant compounds containing six phosphoric acid molecules linked to an organic group). All are digested, absorbed, and utilized, although the fate of the phytins is obscure (p. 168). Controversy exists as to the relative merits of organic and inorganic phosphorus in the diet. Not only does phosphorus enter into the composition of bone and teeth, but it also has an important rôle in the metabolism of proteins, carbohydrates and lipids as well as functioning in the maintenance of the faintly alkaline reaction characteristic of body fluids. The inorganic phosphates of the blood serum vary with age. The maximum, measured as P, is 6 mg. per cent for the breast-fed infant; 5.5 mg. for the artificially-fed; 5 mg. for children; and 4 mg. for adults. Since the inorganic P is increased with greater exposure to the sun's rays, it is highest in May, June and July, and lowest during the winter months.

The reaction of the intestinal tract affects the absorption of calcium and phosphorus, acidity favoring passage into the body. When large amounts of fat are ingested, insoluble calcium soaps are formed, preventing absorption. Possibly fat, by holding calcium back, allows for easier passage of phosphorus into the body. Vitamin D increases the absorption of calcium and also phosphorus. Like calcium, a large excess of iron, manganese or aluminum will interfere with absorption of phosphorus. The parathyroid hormone is thought to enhance phosphorus absorption.

About 90 per cent of the calcium is excreted in the feces chiefly as insoluble phosphate. A larger portion of the phosphorus eliminated is lost through the kidneys than is the case with calcium.

Requirement.—The level of calcium intake most conducive to optimal well-being is significantly higher than that required for normal growth and maintenance (Sherman and Campbell, 1935). The bare calcium and phosphorus requirements fall short of stating the full nutritional need. The absolute amount of either is conditioned by the relative amounts of each, the food sources, and the presence or absence of other factors, as gastric acid and vitamin D.

TABLE 6. **Calcium and Phosphorus Requirements (gram diem).**

	Calcium.		Phosphorus.	
	Minimum.	Optimum.	Minimum.	Optimum.
Children	1.0	2.0	1.2	1.5–2.0
Adults, normal	0.5	1.0	0.9	1.3–1.5
Adults, pregnant or lactating	1.5	2.5	1.5	2.0–3.0

Suggested maintenance levels expressed in terms other than those shown in Table 6 are:

	Calcium.	Phosphorus.
Children, preschool* .	7–9 mg./cm. height 45–50 mg./kg. weight	9–11 mg./cm. height 60–70 mg./kg. weight
10 years .	35 mg./kg.	44 mg./kg.
16 years .	20 mg./kg.	22 mg./kg.
Adult	10–15 mg./kg.	15–20 mg./kg.

* Data from Daniels *et al.*, 1935.

It has been suggested by Drummond (1939) that Nature intended proper growth of bones and teeth without dependence upon the extraordinary reserves in the livers of strange fish. Actually, very little vitamin D is necessary if dietary calcium and phosphorus are optimum. Rickets usually is associated with common diets containing about 50 I.U. of vitamin D, but this does not occur if the calcium amounts to 1.5 to 2 grams and the phosphorus somewhat more. Drummond found 3.5 units per cent vitamin D in human milk. The suckling, therefore, receives approximately 15 units in early life and 35 units at weaning, yet breast-fed infants are not often rachitic. On the other hand, cow's milk which is much richer in both calcium and phosphorus must be supplemented by 100 to 500 I.U. of vitamin D to prevent rickets.

Deficiency.—It should be stressed that the absolute quantities of dietary calcium and phosphorus are of less consequence than the relative amounts unless both are very low. Satisfactory diets keep within the proportional limits of 1:2 and 2:1, Ca to P. The best diet is 1:1 or with a slight excess of phosphorus. Decalcification results if the ratio reaches 1:3 and becomes particularly active at 1:4. The tendency for cereal diets to produce rickets is due to the high P and low Ca content. The view held by Mellanby that the cereal grains contain a specific anticalcifying factor has been challenged by Jones (1939) with experimental evidence. Lack of calcium and phosphorus results in improper composition of dental structures and defective bone formation. Drastic reduction in the dietary calcium and vitamin C leads to loss of the cohesive properties of cells.

Sources.—It is recognized that milk in large quantities is the method of choice for increasing calcium storage in the bones. A quart of milk furnishes about 1.2 grams of Ca and 0.9 g of P. The leafy types of vegetables are richer in calcium and phosphorus than are the grains and fruits. Chatfield (1939) has observed that the calcium varies with the greenness of cabbage leaves; the iron and vitamin-A content likewise are highest in the dark green, non-headed varieties. The phosphorus-rich portion of cereal grains is fed to farm animals and the phosphorus-poor residue goes for human consumption. The dandelion contains more phosphorus than any other common leafy vegetable. The yolk of egg is much richer in phosphorus and calcium than the white.

Magnesium.—According to Sherman, 0.05 per cent of the body weight gives the approximate magnesium content of the adult.

About 71 per cent of the total is held in the bones (Lusk). Muscle tissue is considerably richer in magnesium than in calcium. Blood magnesium averages 3 mg. per cent, serum 2.5 mg., values much lower than those for calcium. Although serum calcium is four times that of magnesium, whole blood is only twice as great, due to the absence of calcium from erythrocytes. The administration of magnesium leads to increased excretion of calcium.

Low plasma magnesium may be associated with hyperirritability of the nervous system, muscular twitchings, and convulsions (Daniels and Everson, 1936). A soft diet (milk and refined cereals) may lead to diminished blood values.

Apparently the average diet contains ample magnesium for the body's needs. According to Sherman, the adult ingests 0.14 to 0.67 (average 0.34) gram of Mg daily. No experimental data are available on the optimal intake of magnesium. Daniels (1936) found the magnesium ingestion of preschool children to vary from 11 to 19 mg. per kg. with an average retention of 1.4 mg.

Iron.—Iron is an essential constituent of hemoglobin, the oxygen-carrying pigment of the blood. Not more than 3 to 4 grams of iron exist in the whole body, of which 2.5 grams is in circulation. The iron content of hemoglobin amounts to only 0.0335 per cent, of liver 0.02 per cent, of heart 0.01 per cent while a small amount of iron is associated with nucleoprotein. Ten per cent of the total hemoglobin in adults supposedly is destroyed daily. According to the *U. S. Yearbook of Agriculture*, 1939, the iron requirements are:

	Mg. per lb
Infants	0.36
Preschool children	0.27
	Mg. per diem.
Boys, 5 to 11	9–11
Over 11	13
Girls, 5 to 11	9–11
Over 11	13–15
Men	12–15
Women, Before menopause	17
During pregnancy	20
During lactation	17–20
After menopause	12–15

Iron deficiency in the diet causes anemia.

Dried fruits are particularly rich in iron, sometimes two to three times what would be expected from the fresh fruit. Seeded raisins have shown an increase over the whole raisins from which they were derived. This has been interpreted as contamination during processing. Canned foods, likewise, may have a higher iron content than anticipated. Such iron has proved to be excellent for the regeneration of hemoglobin in animal experiments according to some investigators and not so good according to others. The high-iron content of Norwegian goat cheese is ascribed to long cooking in iron pans. The iron apparently is bound as a complex salt to lactic and citric acids in sour milk. Milk transported in cans contains more iron than milk taken directly from the cow (Toverud).

Copper.—Copper in infinitesimal amounts promotes the utilization of iron for hemoglobin manufacture and it is possible that its deficiency tends toward anemia. Low levels of copper in the blood plasma are not conducive to rapid regeneration of hemoglobin. Much of the body's copper exists in protein combination, as hemocuprein and hepatocuprein. Its chief function may involve its rôle in physiologic oxidation-reduction systems. Refer also to p. 773.

Although the normal intake of copper is 2 to 2.5 mg. (as Cu) *per diem*, the minimum is probably one-third thereof. Foods prepared in copper utensils or treated with copper sulphate to retain the green vegetable color on canning are apt to provide toxic doses of copper. Milk is sometimes fortified with copper. The liver is the physiologic storehouse for this metal, possibly merely holding it for excretion *via* the bile.

Manganese.—The biochemical significance of this metal has not been elucidated, but it is believed that traces of manganese are essential for the elaboration of hemoglobin. In rats it is necessary for normal reproduction. Manganese is required for normal bone development in chicks. Large amounts of calcium and phosphorus in the diet appear to hinder manganese utilization. Minute amounts of this element have been thought to activate phosphatase. A high-manganese intake exerts a deleterious effect possibly due to interference with the function of some member of the vitamin-B group.

The human requirement for manganese has not been ascertained but Everson and Daniels (1934) suggest that the daily diet of children should contain 0.2 to 0.3 mg. per kilogram of body weight. The chief body depots are the liver, muscles, bones and skin. Little of the manganese ingested is lost in the urine. About 85 per cent of the manganese eliminated is found in the feces.

Iodine.—The three inorganic constituents commonly deficient in the diet are calcium, iron, and iodine. Iodine constitutes 65 per cent of thyroxin, the active principle of the thyroid gland. The human thyroid gland has a total of 4 to 20 mg. of combined iodine, its amount depending upon age and environment.

Combined iodine is widely distributed in rocks and minerals of all kinds. The earth's crust, not the sea, is the storehouse of this element. Iodine is found in the air (0.09 to 2.54 mg.per 1000 c.m.), being present largely in microörganisms and other dust particles. Its content depends upon the temperature, humidity, rainfall, the time of day and year, the winds, the direction and width of valleys, the elevation, and the proximity of the sea. According to von Fellenberg, iodine is plentiful in the air of places where much coal is being burned (as in railroad sidings), since the iodine is liberated by the combustion. Wood, on burning, retains a large part of the iodine in the ashes.

Iodine evaporates from sea water at a considerable rate. This appears in rain water within 3 miles of the ocean in appreciable concentration. Analyses of sea water vary from 17 to 50 micrograms of iodine per liter, whereas fresh water ranges from 0.5 to

2 micrograms per liter. Water from Great Salt Lake shows 70 parts per billion. The purification process robs sea salt of its iodine so that only the crude product can be regarded as containing this element. Seaweed has great capacity for concentrating the iodine of salt water. Where iodine is available, watercress also possesses marked concentrating power.

Water rich in iron was found by Chatin to be rich also in iodine. Hard waters containing calcium and magnesium soon lose their iodine. Rivers are a richer source of this element than are springs. Glacial rivers are low in iodine content.

The iodine in vegetables and grains can be increased enormously by the use of iodine-containing fertilizer, as Chile nitrate. It is not known whether the occurrence of iodine in vegetables is wholly accidental or is essential to normal plant metabolism.

Iodine can be absorbed readily by the lungs, skin, and gastro-intestinal mucosa. Human blood averages 0.006 mg. of iodine per 100 cc. It is excreted in amounts that appear to be independent of the intake. Von Fellenberg established equilibrium between ingestion and elimination after long periods of feeding 14 micrograms a day. When the diet contains 50 to 80 micrograms, an easily-moved iodine reserve is built up. Reduction of iodine in the thyroid gland vigorously resists depletion. Storage and elimination of iodine are dependent upon the form in which the element is ingested. As far as experimental evidence goes, iodine-containing fats, such as cod-liver oil, are best utilized. Then follow in order iodides, plant iodine (as watercress) and animal iodine (as fish with oil removed).

Iodine may be eliminated by the skin and nasal secretions, the amount lost this way being influenced by external conditions and body activity.

Requirement.—According to Orr and Leitch, the daily need of the adult male is 45 micrograms of iodine. The physiologic minimum is placed at 14 micrograms by von Fellenberg. In goiter-free regions the normal intake of iodine ranges from 0.04 to 0.08 mg. per day (Eggenberger). Drinking water is the most constant source of iodine for the vast majority of the people. In general, potable waters show a higher iodine content in winter than in summer. Where endemic goiter is rife, the water should be systematically fortified* with sodium iodide. Where this is not practical, as in rural communities, iodized salt should be prescribed. Inasmuch as the thyroid gland tenaciously retains iodine, artificial addition of it to the diet is not required except at intervals. Potassium iodide is added to common table salt in the proportion of 5000 parts per billion to provide "iodized salt."

The average iodine content of oysters from the Atlantic and Gulf Coasts of the United States is 492 parts per billion on the original moisture basis. One average serving of such oysters (110

*For example, the iodine content of the impounded drinking water of Rochester, New York, which naturally contains only 2 p.p.b., is raised twice a year to 10 to 15 p.p.b. by addition of sodium iodide.

grams) will provide 54 micrograms of iodine or 120 per cent of the daily requirement of 45 micrograms (Coulson).

Three ounces of salmon a day have been advised as a prophylactic measure. This does not provide the total requirement, but is an excellent adjunct to an iodine-poor diet.

Deficiency.—Hypertrophy and hyperplasia of the thyroid gland (parenchymatous goiter) is resultant upon iodine deficiency. With adequate intake the goiter may occasionally resolve or more often during the regression a colloid stage obtains. Goiter and cretinism are unknown where sea-food assumes a prominent place in the dietary.

"The amount of iodine necessary to prevent goiter is very small, according to some statements, only about 1 part in 3,000,000 parts of the body weight. It is important, however, that this amount be maintained, and various investigators have shown that, in localities where food and drinking water do not contain sufficient iodine to supply the proper amount to the body, goiter and other diseases of the thyroid gland usually are prevalent." (Tressler and Wells.)

Although no form of goiter has ever been proved to be due to a diet high in iodine, administration of iodine-containing drugs may cause colloid goiter or an adenoma to become toxic. The quantity of iodine required to produce a skin eruption is generally conceded to be much greater than that needed for goiter prophylaxis.

According to Wiesel and Kretz, non-ionized, organically-combined iodine, such as occurs in plants and animal foods, never leads to iodine intoxication in spite of the fact that this iodine is ingested in quantitatively larger amounts than in iodized salt. There is no recorded case where a person moving from an iodine-deficient goitrous district to an iodine-rich non-goitrous region showed symptoms of iodine intoxication.

Sources.—Articles in the diet which have little or no "fuel value" may have considerable "mineral value." For example, mushrooms and Irish moss are outstanding in their iodine content. Of the everyday foods, leafy vegetables are prone to be the richest source of plant iodine and eggs of animal iodine. Iodine is more plentiful in those parts of plants where green coloring matter is most intense. Young green leaves contain more than etiolated leaves, stems more than roots, and leaves than stems (Heller, *et al.*, 1935).

Preserved fish and fishery products contain iodine in quantities comparable to those of fresh fruit. Fish roes are especially rich in iodine. Liquors from canned shell-fish have a high-iodine content. There are a few sea-foods which rank higher in iodine content than the oyster, but these are usually not so widely distributed, nor so readily obtainable. The iodine of shrimp and crab is concentrated largely in the non-edible portion (Coulson).

The iodine content of plants is at a maximum in autumn and winter. Plants grown on the same soil take up varying amounts of iodine. Onions and asparagus appear to pick up more than cabbages. The latter in turn exceed the legumes which absorb

more iodine from the earth than the cereals. The fruits take up still less iodine. Iodine uptake tends to vary directly with the water available for the growing crop.

Iodine analyses are reported on both the wet and dry basis. Because of the wide variation in the water content of food samples, and because of the minute concentration of the iodine, data on the desiccated material are more satisfactory to the analyst. Figures on the fresh food, however, are more readily evaluated by the layman. The iodine concentration is expressed in a variety of ways: as parts per million or billion (thousand million), as gamma (γ) per cent, as micrograms per kilogram, as milligrams per kilogram. A microgram (γ) is 0.001 mg. or one-millionth of a gram.

$$\begin{aligned} \text{mg. I per kg.} &= \text{p.p.m.} \\ 1000\ (\text{mg. I per kg.}) &= \text{p.p.b.} \\ \gamma \text{ per gram} &= \text{p.p.m.} \\ \gamma \text{ per cent} &= \text{p.p. 100 m.} \\ \gamma \text{ per kilo} &= \text{p.p.b.} \end{aligned}$$

For example, 0.450 mg. I per kg. = 0.450 p.p.m. = 450 p.p.b. = 450 γ per kg.

Methods for determination of iodine where it occurs in minute amounts are far from satisfactory. No figure has been included in Table 72 which was not considered acceptable. The analytical difficulties, however, must not be overlooked. Since iodine in many instances is a highly variable and accidental constituent of food, the tabulated data should be carefully evaluated.

Bromine.—So far as is known, the occurrence of bromide in the body is merely fortuitous and dependent upon food intake (Underwood, 1940). A fruitful source of this element is common salt, one sample of which Dixon (1935) found to contain 1 mg. Br per gram Cl.

According to Neufeld, who should be consulted for a complete review of the biochemistry of bromine (*Canad. Jour. Res.*, Sec. B, **14**, 160, 1936) this element is an invariable constituent of marine algæ; there is no definite relation, however, between the iodine and bromine concentrations. Considerably less bromine is found in land plants, but it is present in measurable amount in the majority of flowering plants. Environment and selective cell affinity appear to be the controlling factors in determining the bromine content of foods. Proximity to the ocean is associated with relatively high values compared to foodstuffs grown inland. The green parts of plants are invariably richer than the roots of the same plant. The fruit or seed contains the least amount of bromine. Melons and tomatoes, however, were found by Damiens and Blaignon (1932) to be outstanding exceptions. Mushrooms (especially the boletus) are also noteworthy in this regard.

The thyroid gland is the richest mammalian organ in bromine although it does not appear to be of functional significance so far as thyroglobulin is concerned.

The mean normal blood bromide level is 0.37 mg. per cent; the average urinary output is 0.65 mg. per cent (Conway-Flood method,

1936). Dixon found the normal blood to vary from 0.39 to 1.36 mg. per cent (av. 0.73 mg.). High values in blood presumably are due to high intake and slow excretion.

Sulfur.—The total sulfur in the body amounts to approximately 0.25 per cent of the total weight. According to Sherman, the daily intake varies from 0.51 to 2.82 (average 1.28) grams. Since sulfur is ingested chiefly in the form of protein and is closely allied with nitrogen metabolism, it is hardly to be classed with the mineral elements. Natural mixed proteins contain on an average 1 per cent sulfur in the form of cystine, cysteine, methionine, and other amino-acid derivatives. The adequacy of a protein is determined in part by its sulfur content.

There is apparently little evidence that the body elaborates sulfur-containing amino-acids for tissue building and repair from inorganic sulfur. Elementary sulfur may be converted into H_2S in the lower intestinal tract, which is a powerful reducing center. Hydrogen sulfide on absorption is rapidly oxidized in the blood stream to sulfates and excreted by the kidneys.

Organic sulfur compounds, notably glutathione and insulin, are of paramount importance in physiologic oxidative processes. The manifold functions of sulfur have, as yet, not been elucidated.

Foods rich in sulfur are usually those of acidic ash. Oxidation to sulfuric acid depletes body base since the acid must be neutralized as it is formed. Sulfuric acid may be produced from amino-acids for conjugation with products of intestinal putrefaction. Sulfur-rich foods may themselves be a source of intestinal toxins.

Until the need was met by Masters and McCance (1939) there existed a paucity of reliable, systematic data on the amount of sulfur in foodstuffs. Although their analyses (refer to Table 73, p. 795) cover English foods, they are generally applicable to the American dietary. In fruits and vegetables the sulfur content is low and exceedingly variable from sample to sample. Considerable sulfur may be lost in the form of essential oils and other volatile compounds. The use of sulfate manures increases the sulfur content of the products grown thereon. High values are seen when dried fruits are treated with sulfur dioxide for preservation. The enormous sulfur content of carrageen moss is probably due to large quantities of inorganic sulfates. Masters and McCance tested the reliability and applicability of their figures by preparing four cooked dishes using standard recipes, then analyzing the prepared food and comparing the observed sulfur content with that calculated; excellent agreement was obtained.

Zinc.—Investigations concerning the rôle of zinc in nutrition offer much promise. From the work of Scott and Fisher (1938) it would appear that zinc is concerned with storage of insulin in the pancreas. Eggleton (1939) has considered the possibility of zinc deficiency as a factor in the beri-beri syndrome.

The zinc content of milk has been placed at 2.5 to 3.5 mg. per liter —a comparatively high concentration. According to Eggleton, the amount of zinc found in foods is positively correlated with their

thiamin content. The human requirement is unknown, but Scoular (1939) has suggested 0.3 mg. Zn per kilogram for preschool boys.

Cobalt and Nickel.—Studies on the function of cobalt in nutrition have been confined largely to diseases affecting cattle and sheep. According to Underwood (1940) "impaired growth and appetite, wasting of the musculature, marasmus and varying degrees of anæmia are invariable symptoms of Co deficiency." Cobalt in large doses provokes polycythemia vera.

Cobalt is a contaminant of iron salts. In general the concentration of cobalt in animal tissues exceeds that of nickel; the reverse holds for plants. There is more cobalt and nickel in the pancreas than in any other organ studied. To some extent nickel may be able to replace cobalt in nutrition.

Water.—Inasmuch as water forms the bulk of the body and its loss is continuous, the physiologic need is obvious. A person may be deprived of food for a long period of time, but water can be withheld only for a few days. Muscle tissue holds 40 to 45 per cent of the total body water, the skin over 20 per cent. These two tissues suffer most from dehydration when the supply of water is inadequate. In mammalian muscle, 19 to 27 per cent of the total muscle water is "bound" to the colloids and does not function as free water The "gel" consistency of protoplasm is due to this property of imbibition. Glycogen and protein stores hold 3 or more parts of water; fat is laid up almost dry, at most 0.2 gram of water being retained for each gram of fat. Conversion of glucose to glycogen for storage purposes involves change to a colloidal form which has little effect upon the osmotic pressure of the system. The marked decrease in solubility in passing from glucose to glycogen prevents the circulating water from washing this carbohydrate from the tissues.

Water is continually shifting about the body so as to provide a vehicle for digestive juices and other secretions, to transport nutriment, and to carry off waste-products. Equilibrium within narrow limits is maintained between circulating fluids, extracellular and intracellular, free and bound water. Adjustment can be made very rapidly. Forced administration of great quantities of water leads to an intoxication which is characterized by convulsions and renal fatigue.

Water retention is curtailed by a high-protein, low-salt diet in which there is an adequate supply of the vitamin B complex. A low Na:K ratio is requisite.

Water is produced within the body by chemical changes. Each molecule of glucose, $C_6H_{12}O_6$, converted to glycogen, $(C_6H_{10}O_5)_x$, provides 1 molecule of water which amounts to about 60 grams of water for every 100 grams of carbohydrate. Oxidation of glucose releases 6 molecules of water for every molecule burned. Combustion of fats and proteins likewise produces water, the former yielding over 100 grams of water, the latter 40 to 45 grams per 100 grams of food oxidized.

Ingestion.—Seventy-five to 80 per cent of the total food eaten is water, part of this being in "free" form. The amount of water demanded per day depends upon the dietary habits of the individual and upon climatic conditions. In the California desert, 11 to 12 liters a day are needed for heat regulation; even then it is possible to suffer from thirst. Whenever the surrounding temperature equals or exceeds 98.6° F., heat is lost, not by conduction and radiation, but only by evaporation of water. The normal requirement of water approaches 2 liters per day, or about 700 cc. more than that eliminated by the kidneys. In forcing fluids, a glass an hour is recommended. Three liters a day is the usual limit for a 150-pound adult, comparable amounts for an infant being 90 to 100 cc., for a child, aged five to eight years, 600 to 800 cc., and for one, aged eight to twelve years, 1000 to 1500 cc.

Elimination.—The kidneys excrete 1000 to 1500 cc. per twenty-four hours. The volume decreases as perspiration increases. Insensible loss of water does not exceed 21 grams per square meter of body surface per hour. According to Marriott, the average adult exercising lightly in an atmosphere of 65° to 75° F., with 35 to 60 per cent humidity, eliminates 30 to 60 grams of water per hour by evaporation, which amounts to 10 to 20 grams per kilogram of body weight per day, a total of 650 to 1400 cc. of water. This includes the water lost through the expired air—approximately 600 cc. per day. The loss of water through normal fecal excretion is 60 to 150 cc. daily.

Vitamins.—Full vigor and health demand for their maintenance substances other than carbohydrates, proteins, fats, minerals and water. Several of these food accessories have been competently investigated, but the present-day knowledge is far from complete.

Since chemical tests for vitamins are of limited value these substances must be assayed by biologic experimentation, the approach being made from either a curative or a prophylactic viewpoint. Data obtained on experimental animals under highly artificial circumstances cannot be applied in detail to humans who rarely exist under control conditions. Vitamin deficiency in man is always a complex matter, making the clinical aspects difficult to evaluate. Vitamin deprivation ultimately produces widespread constitutional mal-effects. The availability of any one vitamin is not entirely a matter of its ingestion. The chemical environment in which the vitamin is elaborated and its vitamin and food associates in the alimentary canal determine in some measure the degree of its utilization.

Vitamin literature is crowded with abortive investigations and unwarranted claims. Early evidence, accumulated during enthusiastic research and prematurely published, too often has not been corroborated at a later date. Coincidence has been too often mistaken for established cause and effect. Much that is printed on the subject of vitamins is confusing and often deliberately misinforming. The problem demands that we commit ourselves warily to fixed opinions, but that we be not over slow in adopting newer ideas

nor too ready to discard the older ones. Specific suggestions ar offered for avoiding the dangers of vitamin shortage inherent i certain therapeutic and other diets. Although it is recognized tha vitamin deficiency involves several factors simultaneously, it i necessary, with our limited knowledge, to treat each vitamin mor or less as a separate entity. Such approach to the problem o food accessories does not reveal the manifold interrelationship undoubtedly at work in the maintenance of human nutritiv efficiency.

SECTION V.

ACID-BASE FACTORS IN NUTRITION.*

MARJORIE R. MATTICE, M.S.

BOTH the medical profession and the laity have been besieged vith a tremendous amount of inaccurate and irreconcilable informaion relative to the acidity of foods. Whenever reaction of foods is nentioned, there is confusion over metabolic end-products *versus* astric and intestinal effects. The "reaction" of a food is frequently udged by the pH or titratable acidity of the urine subsequent to he ingestion of the food. This viewpoint is not entirely tenable ven with reference to the metabolic behavior of foods and it cerainly has no bearing upon the "reaction" of foods within the alinentary tract. Foods as eaten create a mental impression of eutrality or acidity. An extraordinarily acid-tasting food, howver, may be altered in the body to a definitely alkaline substance. Neutral foods, on the other hand, may give rise to acids during the ourse of metabolism. The designation, therefore, of the reaction of a food requires qualification as to point of view.

REACTION OF FOODS *PER SE*.

Tabulated data with reference to the true acidity or pH of foods vill be found in the Appendix (p. 736). Reciped foods and sodaountain items have been separated from the main table. By eciped foods it is to be understood that standard recipes have been ised for preparation. Canned items (commercial) are included in Table 62 since they are not subject to the wide variation anticipated inder changing kitchen conditions. Some items will not be found ince they were troublesome to test. Butter, oil-and-vinegar, and other fatty mixtures do not readily lend themselves to pH measurenent with the glass electrode which was employed for all the data issembled in these tables.

As might be expected, those foods acid to the taste are far down he pH scale. Those disagreeably acid to all palates approximate pH 2. Above pH 5, in general, and above pH 4 not infrequently, oods can be described as neutral to the tongue. *Insofar as they do iot induce further secretion of gastric acid*, foods showing pH values greater than 5 are essentially "alkaline" in the stomach. It is not possible by introducing into the stomach a food acid to produce an lkaline reaction as is so frequently claimed for the citrus fruits. Any alkalinity attributable to these fruits is dependent upon the oxidation of the citric acid to carbonate after absorption has occurred.

Very few foods are found to be alkaline. The only common ones consistently so are graham crackers and cold storage eggs. Eggvhite, shrimp, lobster and conchs are usually alkaline. Occasionally, oda crackers, sweetbreads, duck, clams, cantaloupe, fresh spinach,

* Pages 127 to 134 reprinted with permission from Am. Jour. Dig. Dis. 6, 140, 1939

and fresh or frozen corn may reach or exceed pH 7. The rapid shift of whole eggs to an alkaline reaction is shown in Table 7.

The cereals and cereal products which are so widely used in ulcer diets do not fall below pH 5 as a rule, except in the case of pumpernickel bread (pH 4.4). It should be stressed that the cereals were tested with addition of just enough water to moisten them. As consumed, more or less generous amounts of milk accompany the cereal and tend to raise the pH although it will be seen that many of these breakfast foods already exceed pH 6.

The introduction of milk or cream into a beverage or soup raises its pH. This is demonstrated in Table 63 (p. 744) under coffee, tea and chocolate beverages. It is also noticeable in the various soda-fountain drinks. A strawberry ice-cream soda of pH 4.75 is elevated to 5.20 by introduction of the customary "shot" of milk; the strawberry ice-cream in this instance was pH 5.60. Due to the fruit acid, a strawberry "frosted" (or milk shake) is more acid than a chocolate one (pH 5.82 and 6.33, respectively). The introduction of malt or egg raises the pH still further.

With the exception of tomato, the "home-made" cream soups were found to approximate pH 6.2; the corresponding canned products were more acid (as cream of pea, pH 6.17 and 5.72, home-made and canned, respectively; cream of mushroom, pH 6.20 and 5.95; and

TABLE 7.—**Variation in pH of Eggs With Age.**

Age	Whole	White	Yolk
3 hours	6.58	7.96	6.10
	7.00	8.20	6.88
12 hours (or less)	6.70	7.90	6.00
24 hours	6.62	8.30	6.10
	6.60	8.35	6.10
48 hours	7.43	8.89	6.17
	7.87	8.85	6.29
"New-laid" store eggs	7.72	9.18	6.64
	7.72		
Cold-storage eggs	7.50		
	7.60		
	7.69		
	7.58		
	7.32		
	8.20		
	7.90		
	7.62		
		8.87	
		8.99	
		8.80	
		8.90	
		9.00	
		8.63	
		9.00	
		9.00	
			7.00
			6.90
			6.38
			6.72
			6.82
			7.80
			7.20

Data carried across table represent analyses on the same egg, the white and yolk being mixed after separate testing.

cream of tomato, pH 5.62 and 4.62). In this connection it is interesting to note the reaction of broth (pH 5.5 to 6.2) since it is well recognized that broth is clinically contraindicated in cases of gastric hyperacidity. It is obvious, however, that the detrimental factor cannot be the pH of the broth.

Although plain gelatin gives a pH of 6.08, its preparation as a dessert involves the introduction of fruit acids so that the finished product is apt to be pH 3. Regardless of the fruit used, preserves and jellies usually vary from pH 3 to 4.

Honey is noteworthy in that it shows a pH of 3.8, in contrast with Karo and maple syrups at pH 4.5 and 5.15, respectively.

In general, the vegetables vary from pH 5 to 7. Exceptions are tomatoes between pH 4 and 5, and sorrel and sauerkraut which are more acid than pH 4. Canned vegetables and fruits also proved to be more acid than those freshly cooked, as shown in Table 8.

TABLE 8.—**Comparison of the pH of Fresh and Canned Vegetables.**

	Asparagus.	Beets.	Peas.	Corn.	Carrots.
Fresh . .	6.03–6.16	5.23–5.90	6.22–6.88	6.22–7.04	5.58–5.88
Canned .	5.20–5.32	4.92–4.98	5.71–6.00	5.90–6.44	5.18–5.22

The frozen products have been found to be close to the reaction of the fresh-cooked vegetables with a definite tendency toward greater alkalinity.

Although practically no experiments were conducted to demonstrate the type of change involved in cooking, there appears to be a definite tendency toward greater alkalinity on boiling a food. In one instance, a sample of tomatoes was found to be pH 4.20; after it was stewed, the value was 4.32. Data on vegetables eaten both raw and cooked have been assembled in Table 9, but it must be stressed that the tests were conducted on totally different samples and so are not strictly comparable.

TABLE 9.—**Comparison of pH Values on Some Raw and Cooked Vegetables.**

Item.	Raw.	Cooked.
Cabbage, green	5.79–6.29	6.38–6.82
Cabbage, red	5.43–6.00	6.21–6.42
Carrots	5.96–6.00	5.58–5.88
Celery	5.86–6.00	5.37–5.92
Fennel	5.48–5.88	5.80–6.02
Leeks	5.51–6.07	5.79–6.16
Sorrel	2.98–3.27	3.49–3.80

Bananas, figs, papayas, persimmons and watermelons are less acid than most fruits and vary between pH 5 and 6. Melons of the cantaloupe type and avocados exceed pH 6 and may even be alkaline. The acid character of the fruits, however, is reflected in the pH encountered with the vast majority. With the exceptions noted, fresh, cooked and canned fruits vary from pH 3 to 5. Those below pH 3 include some of the grapes, plums and occasional samples of grapefruit juice. Cranberry juice is usually more acid

than pH 2.5 while limes and lemons are close to pH 2. Although it is possible that the tamarind, a tropical legume, is the most acid of our fruits, beverages made from it were found to vary from pH 2.60 to 2.82. Fruit drinks below pH 2.5 are rarely acceptable. Acidity greater than pH 3 renders a fruit unpalatable to many individuals.

Although difference in pH might be expected from sample to sample of the same item, remarkably little is encountered. For instance, the pH of Welsh rarebit removed from the hospital dining room was found to be 5.04 and nine months later a similar item was pH 5.08. Also, two bottles of grape juice of different brands both rated pH 3 and 3.05, 3.06 on dilution 1:1 with water, the tests being conducted over a year apart. These and similar observations would point to considerable consistency in the reaction of foods unless, of course, spoilage occurs.

TABLE 10.—**Acid Activity* Over pH Range of Foods Reported.**

pH.	Acid activity.	pH.	Acid activity.	pH.	Acid activity.
9.0	0.010	6.6	2.51	4.2	631.0
8.9	0.013	**6.5**	**3.16**	4.1	794.4
8.8	0.016	6.4	3.98	4.0	1,000.0
8.7	0.020	**6.3**	**5.01**	3.9	1,259.0
8.6	0.025	6.2	6.31	3.8	1,585.0
8.5	0.032	6.1	7.94	3.7	1,995.0
8.4	0.040	**6.0**	**10.00**	**3.6**	**2,512.0**
8.3	0.050	5.9	12.59	3.5	3,162.0
8.2	0.063	5.8	15.85	3.4	3,981.0
8.1	0.079	5.7	19.95	3.3	5,012.0
8.0	0.100	5.6	25.12	3.2	6,310.0
7.9	0.126	5.5	31.62	3.1	7,944.0
7.8	0.159	5.4	39.81	3.0	10,000.0
7.7	0.200	5.3	50.12	2.9	12,590.0
7.6	0.251	5.2	63.10	2.8	15,850.0
7.5	0.316	5.1	79.44	2.7	19,950.0
7.4	0.398	5.0	100.00	2.6	25,120.0
7.3	0.501	4.9	125.90	2.5	31,620.0
7.2	0.631	4.8	158.50	2.4	39,810.0
7.1	0.794	4.7	199.50	2.3	50,120.0
7.0	1.000	4.6	251.20	2.2	63,100.0
6.9	1.259	4.5	316.20	2.1	79,440.0
6.8	1.585	4.4	398.10	**2.0**	**100,000.0**
6.7	1.995	4.3	501.20	1.9	125,900.0

* If the decimal point of *Acid Activity* is moved seven places to the left, the resultant value will be hydrogen-ion concentration (gram/liter).

Hydrogen-ion Concentration versus pH.—The reaction of the various foods tested is presented in terms of pH. It will be noted that values designated as "average pH" are not given. Inasmuch as pH is logarithmic, it is not permissible to obtain its arithmetic mean. pH values cannot be treated as though they were actual numbers. No serious error, perhaps, would be committed in averaging the tabulated results of the foods herein presented, but such a practice would reveal lack of comprehension of the fundamental meaning of the term pH.

Since many workers in the field of nutrition have had limited experience with this term now current in every discussion, it is desirable to demonstrate by what simple means the significance of

H can be comprehended. The acidity of a medium is dependent pon the number of hydrogen ions present. When expressed in the onventional forms for designating concentration, the smallness of ne value makes representation awkward. For example, a tangerine nay be known to contain 0.00004467 gram H^+ per liter. Because f the difficulty in handling such a number, it is customary to write as 4.467×10^{-5}. This arithmetical value may be more conveniently used in its logarithmic form, $1 \times 10^{-4.35}$, but this renders well-nigh incomprehensible to the average interested reader. Once cast in this form, the corresponding pH may be obtained by iscarding everything but the 4.35. This appears to be a number hich can be easily understood, but in reality it is not a number t all. The four designates only the position of the decimal point n the real number to which the pH corresponds. Although the 35 s logarithmic, it cannot be located in any "log" table since it is egative. After conversion to a positive value, the table will reveal he significant figures in the real number, the decimal point being nserted as already indicated.

Moving acid on the pH scale from the theoretical neutral point f 7, each interval (as 0.1 pH) is greater (in terms of actual acidity) han the preceding; yet the pH scale shifts slowly downward toward hypothetical zero with a regular "arithmetic" progression. Consequently, the change in acidity is far greater between 3 and 4 than etween 6 and 7, although from the pH scale the change would seem o be identical. Furthermore, the mid-point does not occur at 0.5 n the pH scale, but at 0.3. For instance, pH 6 is ten times as cid as pH 7, pH 6.5 is but slightly more than three times as acid, hereas 6.3 is five times as acid as pH 7 (see bold face figures in Table 10). Likewise, pH 4.8 and 4.9 are nearer to each other in ctual acidity than 4.1 and 4.2, all of which makes comparison of H values difficult for the uninitiated. Although it must be granted hat pH values are easier to inspect, they are much harder to nterpret than hydrogen-ion concentrations.

Unfortunately, acid concentration directly expressed involves nathematical forms with which many are unfamiliar. To remedy his difficulty and make comparison easy, tables are shown elsewhere (see p. 747). Although much of the information in these ables is similar to that offered by Wherry, the fundamental reasoning is very different. If the term, *acid activity* (which has no meaning with reference to these or any other data except as specifically tated) is multiplied by 10^{-7} (that is, by 0.0000001) the result will e hydrogen-ion concentration in gram-equivalents per liter. Since his understood factor is the same throughout, evaluation of the orresponding pH values is readily undertaken. For example, how nuch more acid is the pH 2.0 of lime juice than the pH 3.6 of range juice? From Table 10 it will be seen that lime juice is oughly forty times as acid as orange juice since their *acid activities* re 100,000 and 2512 respectively.

In Table 11 the effect of dilution of a fruit juice with water appears be small from the standpoint of pH, yet if these data are recast

in terms of actual acidity, the change is obviously considerabl[e]. This table demonstrates how difficult it is to judge acidity merel[y] from pH values.

The point on the pH scale at which hydrogen and hydroxyl ion[s] equal each other, namely 7, is devoid of practical meaning. Th[e] sharp separation of solutions below 7 from those above it into aci[d] and alkaline respectively is a wholly artificial device. The chemis[t] largely disregards this theoretical neutral point and establishes ne[w]

Table 11.—**Effect of Dilution on Acidity of Fruit Juices.***

	Straight.		Diluted 1:1 with water.		Diluted 1:5 with water.	
	pH	Acid activity.	pH	Acid activity.	pH	Acid activity.
Apple	3.62	2,399	3.68	2,089	3.72	1,906
Cranberry	2.40	39,810	2.60	25,120	2.94	11,480
Grape	3.00	10,000	3.06	8,710	3.13	7,413
Grapefruit	3.25	5,623	3.32	4,786	3.38	4,169
Lemon	2.32	47,860	..	..	2.55	28,180†
Pineapple	3.37	4,266	3.46	3,467	3.52	3,020
Tomato	4.10	794	4.15	708	4.20	631

* Commercially canned.

† Diluted 1:10 with water, otherwise unpalatable.

and different "neutral" points as necessitated by the type of chemical change under experimentation. The physiologist has still less use for pH 7 since biochemical processes are limited to definite concentrations of hydrogen ion without regard for the absolute neutral point. Gastric digestion, for instance, proceeds normally at pH 1.6 to 1.8; when this value reaches pH 3, the condition is described as anacidity. On the other hand, pH 7.2 is decidedly acidotic so far as blood plasma is concerned. Furthermore, litmus paper reacts "alkaline" below pH 7 so causing urine samples to be reported as alkaline when in reality they are on the acid side of neutrality. Extreme acidity in the stomach necessitates a pH of approximately 1.2; extreme acidity is reached in the urine at pH 4.6; fatal acidosis is encountered before the blood falls to pH 7. Each of these body fluids has its own normal or what might be termed "neutral" point from which it varies toward a relatively more acid or alkaline state. Each "acid-base" relationship is balanced about an individual point which is wholly unrelated to absolute neutrality (pH 7).

Clinical Interpretation.—It is possible that the future will demonstrate that the pH of the food *per se* is of little moment. Presumably the most important factor is the property of the individual food in stimulating the flow of gastric juice whether this be attributable to hydrogen ion, to other constituents in the food, or to products of digestion.

Actually few substances are introduced into the stomach which can compete with the acidity of HCl. Only 2.9 per cent of all the foods tested showed values less than pH 3. None approximated normal gastric acidity at the height of digestion (pH 1.6 to 1.8). Those foods which reach the level of low gastric acidity (pH 2.0 to

4), as lemons and limes are rarely consumed as such. The imme-ate physical effect of introducing food into the stomach, be the od highly acid or not, is to dilute the gastric juice and so diminish ne acidity, but the normal response to the presence of food is secre-on of sufficient HCl and pepsin for the digestion thereof. Conse-uently, the ultimate result may be increased acidity regardless of ne original reaction of the food.

Although foods vary in their ability to stimulate the flow of gastric iice, this effect is largely an individual matter so that generaliza-ons are more or less meaningless when applied to specific cases. he gastric response depends upon idiosyncrasy of taste, varies with ne whim of the subject during health, and is markedly altered uring illness. Fatigue, nervous strain, mental abnormalities and ne like may occasion unusual and unexpected variation in gastric ehavior.

Because of the psychic, thermal, and mechanical stimuli of din-ig, it is difficult to determine the precise behavior of foods under eproducible conditions. Even water will stimulate the flow of astric juice. The hyperacidity associated with overingestion of ater in diabetes insipidus is a case in point. Coffee and tea are oth associated with increased gastric acidity. Alcoholic beverages, i small amounts, induce acid secretion although gastric hypoacidity common among chronic alcoholics. Tobacco is in no sense a food djunct, but smoking in moderation stimulates production of hydro-hloric acid. Extremely hot or cold foods have an irritating action pon the stomach which may result in increased acidity.

The level of the gastric acid is believed by some to be related to ne blood sugar. Administration of insulin produces hypoglycemia nd also stimulates the flow of hydrochloric acid. It has yet, how-ver, to be conceded that hyperacidity universally accompanies ypoglycemia and *vice versa*, although excellent clinical results have een secured by avoiding the reduction of blood sugar in patients ith excess gastric acid.

The most abundant and best sustained secretion of acid is achieved ith meat, partially digested protein being the exciting agent. Broths, meat extracts and stock soups as well as gravies elevate astric acid. Smoked and brined foods, mustard, pepper, horse-adish, chili-sauce, salad dressings, pickles, garlic, sweet herbs, spices, nushrooms (an otherwise useless food), and fruit flavors as well as romatic substances characteristic of many of our foods and bever-ges add to the zest of eating and act as gastric stimulants. New, nfermented cider is thought to be one of the strongest acid pro-ucers. From clinical experience, the leafy vegetables have proved omewhat acid-stimulating. The effects have been attributed to he presence of organic acids.

The irritating action of citrus fruits in ulcer cases is so well known hat these patients are routinely deprived of this source of vitamin C or long periods of time. Symptoms of scurvy not infrequently evelop under these conditions. Orange juice on an empty stomach scarcely to be recommended for ulcer patients, yet sufficiently

"buffered" by the various constituents of the Sippy diet enough of this fruit juice can be given to ward off ascorbic acid deficiency. Although a consistent daily intake of 25 mg. will suffice, double this amount is desirable. Insofar as actual pH is concerned, the acidity of orange juice can be counteracted by addition of sodium bicarbonate just prior to ingestion but it is preferable to include it with the meal. Many patients encounter no difficulty with as much as 3 to 4 ounces of orange juice when it is immediately preceded and followed by a like amount of milk. Alteration in pH values of Sippy diet mixtures is shown in Table 12 although it must be stressed repeatedly that the pH of the mixture is not the sole factor determining the effect in the stomach.

Table 12.—**The Effect of Orange Juice on Sippy Diet Mixtures.**

Food mixtures.	pH
Cream, 20 per cent	6.60
3 t. cream + 1 t. orange juice	5.00
Farina with 20 per cent cream	6.70
3 t. cream-cereal + 1 t. orange juice	4.93
Beaten egg with 20 per cent cream	6.90
3 t. cream-egg + 1 t. orange juice	5.85
Orange juice used throughout	3.75

It is suggested that ulcer patients do not attempt to swallow the 50-mg. tablets of cevitamic acid sometimes prescribed. In a minimum amount of water such tablets give a pH in the neighborhood of 3. Increase in the volume of water raises the pH. When taken with food, this acid scarcely affects the pH (as shown in Table 13) and is usually well tolerated by the patient.

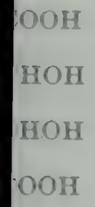
Table 13.—**The Effect of Cevitamic Acid on Ulcer-diet Mixtures.**

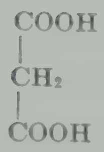
Food mixtures.	pH
Cevitamic acid Solution I (50 mg. suspension in 50 cc. water)	3.42
Cream, 20 per cent	6.53
4 t. cream + 5 cc. Solution I	6.52
Cevitamic acid (50 mg.) in 10 cc. cream	5.70
1 t. Farina + 2 t. cream	6.72
with 5 cc. Solution I	6.62
Beaten egg	7.48
4 t. egg + 5 cc. Solution I	7.30

Organic Acids in Foods.—It has already been pointed out that it is, at times, necessary to take cognizance of the acidity of the diet as received into the stomach. The reaction of the food is also a matter of interest to the dentist. In general, fruit acids are found chiefly in the free state whereas vegetable acids occur more frequently as salts. Since knowledge concerning their physiologic behavior has resulted in a widening appreciation of their varied functions, it is desirable for the nutritionist to become familiar with these chemical agents.

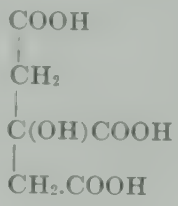
According to Nelson, many erroneous statements regarding the incidence of specific acids in fruits have been retained in supposedly authoritative works. Malonic acid, for instance, is *not* found in fruits. Oxalic, benzoic, succinic and lactic acids never occur in large quantities. Despite reports to the contrary, Nelson insists

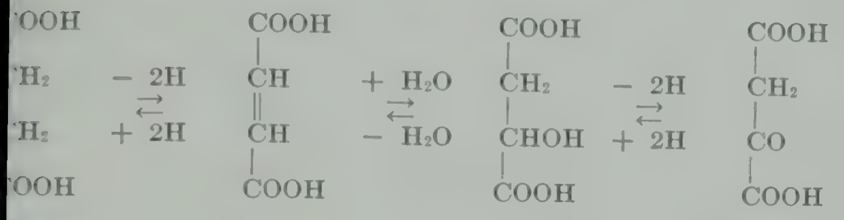
ORGANIC ACIDS.

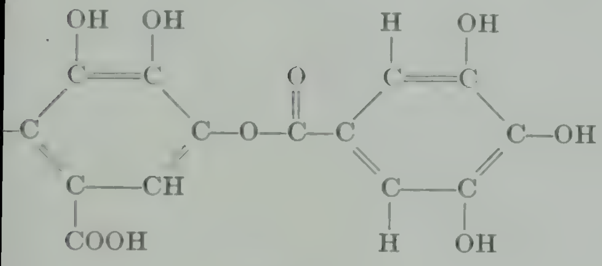

'artaric

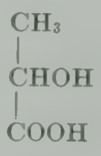

Malonic

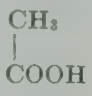

Oxalic

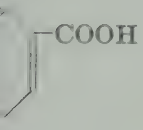

Citric

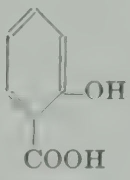

uccinic *Fumaric* *Malic* *Oxaloacetic*

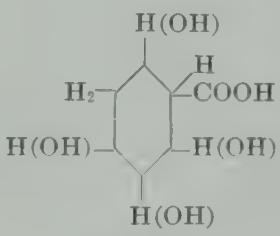

Tannic

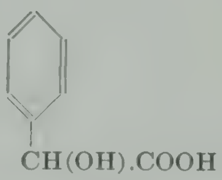

Lactic


Acetic


zoic


Salicylic


Quinic


Mandelic

at few fruits except the tamarind and grape (including raisins, of urse) contain appreciable amounts of tartaric acid.

The two predominating acids in fruits and vegetables are malic l citric. Table 66 (Appendix) which presents values for the d components of a few fruits, vegetables, and miscellaneous foods concerned, therefore, largely with these acids. The acidity of anges, lemons, grapefruit, limes, and most berries is almost tirely due to citric acid. This acid occurs free in tomatoes. aches, pears, and apricots contain malic as well as citric acid. nubarb, apples, and quinces owe their acidity to malic acid. obably all the acid in cantaloupe is citric, that in watermelon alic (Bigelow and Dunbar).

Malic Acid.—This acid is rapidly metabolized in the body and is potential alkalinizer. The vegetables are notably poor in *l*-malic d although much occurs in fruits and their jellies. This acid is nd in molasses from sugar-cane. The "sand" seen in the sap the sugar maple is calcium malate.

Citric Acid.—There appears to be no limit to the ability of the body to oxidize citric acid. It can be oxidized or synthesized with equal facility according to physiologic need. It is elaborated chiefly from carbohydrate and fat residues in response to excessive alkalinity (Smith and Meyer, 1939). According to Orten and Smith (1939) it is produced chiefly in the kidney or depends upon this organ for its formation. Citric acid is widely distributed in body fluids and cells, yet does not seem to be stored in any tissue; its concentration in tissues rarely exceeds 2 mg. per cent. Its destruction occurs in the liver and in the muscles.

Differing from the acid in its behavior, sodium citrate ingestion is followed by a large urinary output. The disodium salts of succinic, fumaric, malic and malonic acids result in marked urinary excretion of citric acid. Sodium bicarbonate will raise the usual urinary citric acid concentration of 0.25 to 1 gram per day to 2 or more grams. On the other hand, administration of hydrochloric acid or acidifying salts, as ammonium or calcium chloride, cause a significant decrease in the excretion of citrate. According to the hypothesis of Oestberg (1931) citrate functions as a "physiologic acid" for the removal of excess base from the body just as ammonia is the "physiologic base" for the conservation of sodium, potassium and calcium when acid radicals are drained out through the kidneys.

On a low-phosphorus but otherwise adequate diet, Schneider and Steenbock report finding urinary calculi composed almost entirely of calcium citrate. Possibly this may serve as a nidus upon which other salts precipitate under different dietary conditions.

The biochemistry of citric acid is important because of its connection with carbohydrate metabolism and vitamin function. Citric acid can be synthesized *in vitro* from pyruvic and oxaloacetic acids (Knoop and Martius, 1936). Apparently this synthesis occurs physiologically (Hallman and Simola). It is probable that vitamin B_1 plays an essential rôle in the decarboxylation of the precursor of citric acid formed from pyruvic and oxaloacetic acids. The chain of reaction continues through α-ketoglutaric, succinic, fumaric, and malic acid to oxaloacetic again. By this process pyruvic acid is converted into carbon dioxide:

$$CH_3.CO.COOH \rightarrow 2H_2O + 3CO_2.$$

Succinic Acid.—The dicarboxylic acids possessing four carbon atoms function as extremely important catalysts in oxidation. The chemical relationships may be seen on p. 135. In biologic oxidations the hydrogen of the foodstuff and the respired oxygen react only through a series of cytochromes (iron-containing compounds), succinic, fumaric, malic and oxaloacetic acids under the instrumentality of various enzymes.

Szent-Györgyi (1939) has elucidated the function of the dehydrogenase of succinic acid—an extraordinary enzyme in muscle tissue considering that this acid itself is not one of those found to any extent in foodstuffs. So far as is known, no substance other than succinate, activated by its dehydrogenase, can reduce cytochrome

inodehydrogenase is distinct from other dehydrogenases in re-ing no codehydrogenase. The latter, it will be recalled, include pyridine-containing vitamins.

artaric Acid.—The fate of tartaric acid in the body is uncertain. xcessively large amounts, it is nephrotoxic. Unlike citric acid ch is not attacked in the intestinal tract, tartaric acid is readily ken down, sometimes to potassium carbonate which on absorp- is said to account for the alkalinizing effect noted by some stigators. Since tartaric is not the only organic acid in grapes raisins, the reported potential alkalinity of these substances be attributed to these other acids.

he acidity of wines is expressed as tartaric acid and varies from to 1.7 per cent (Jacobs, 1938).

xalic Acid.—Like citric acid, oxalic acid is a normal constituent blood and urine. Its metabolism is imperfectly understood. doubtedly the urinary oxalate, which amounts to 15 to 20 mg. *diem*, is both endogenous and exogenous. Food oxalates are dered soluble by a plentiful supply of gastric acid although they subsequently be precipitated in the intestinal tract. Lack of hydrochloric acid permits the passage of bacteria and is asso-ed with increased intestinal fermentation in which soluble oxa-s are released presumably from carbohydrate precursors. There creased oxalate excretion whenever glucose metabolism is irregu- Incomplete oxidation due to oxygen deficiency has been thought e a cause of the increased output of oxalic acid. Insulin lowers blood oxalate whereas adrenalin raises it.

he oxalic acid content of some common foods is presented in ble 68 (Appendix).

actic Acid.—One of the chief advantages of milk sugar, especially iven in fair dosage, is that it escapes digestion and absorption, s reaching the lower intestinal tract where it is available for use a bacterial substrate. The lactic acid produced aids in the orption of calcium and phosphorus and in the elimination of onic wastes by increasing intestinal motility.

actic acid is a normal constituent of blood (15 to 25 mg. per cent) urine (0.05 to 0.2 gram *per diem*). It is increased during exer- whenever the supply of oxygen is inadequate. It is chiefly a tabolic acid, but may be ingested in appreciable amounts as in lactic acid milk prescribed for babies and used in gastro-intestinal turbances. Such milk is associated with increased acidity of the ne due to unusual amounts of phosphates; the lactic acid is com-tely oxidized.

our and fermented milks contain variable quantities of lactic d, usually about 1 per cent. Winton gives the following values: umiss, 0.6 to 1 per cent (alcohol, 2.7 to 2.9 per cent); kefir, 0.7 to per cent (alcohol, 0.2 to 1.1 per cent); yoghurt, 0.8 per cent; and en, 1.6 per cent.

nder bacterial action the lactose of cheese is converted into lactic d. These two usually are reported under the one heading and y vary from less than 0.5 to over 5% per cent. The hard rennet

cheeses, as a rule, do not exceed 2.6 per cent lactic acid. Somewhat higher concentrations are encountered with soft rennet cheeses. Cottage cheese, which belongs to the sour milk group, has been reported at over 4.3 per cent lactic acid. Whey cheese, as the Scandinavian Mysost, while it may rate over 56 per cent lactose + lactic acid, contains less than 4 per cent lactic acid. Many of the lower fatty acids, as butyric, are also found in cheese.

Minute amounts of lactic acid occur in fresh eggs. This is increased on incubation.

Lactic acid has been reported in apples, raspberries, cherries and tamarinds (Smith and Orten). Sauerkraut juice usually varies from 1 to 1.5 per cent lactic acid. Dill pickles contain 0.25 per cent of this acid.

Tannic Acid.—The tannins are a group of astringent aromatic organic acids widely distributed in plants and important as flavoring agents. The term is indefinite and may refer merely to tannic acid (also known as digallic and gallotannic acid) or to glucoside derivatives. Tannic acid is not the only astringent in fruits. The pigment *enin* in dark-colored grapes, for example, gives most of the reactions of the tannins but is less astringent. In officially accepted methods, tannin and coloring matter are determined together.

Depending upon the conditions of brewing, variable amounts of tannic acid are removed from tea leaves which have been reported to contain tannin in amounts from 4 to 26 per cent. Appreciable quantities of tannin occur in coffee beans. The longer tea and coffee are subjected to boiling water, the greater the percentage of tannic acid extracted.

Tannins which occur in the astringent fruits tend to diminish with ripening or on storage. The American persimmon, for instance, has been reported to change from a concentration of 2 per cent to a trace in five to eight days' storage. The tannin content of blackberry, raspberry, strawberry, and cherry juice amounts to approximately 0.1 per cent, in pear juice to about 0.2 per cent. Less than 0.1 per cent tannin is found in quince. Plums may contain over 0.2 per cent tannin, strawberries and black currants over 0.4 per cent. Apples vary from 0.01 to 0.4 per cent, grapes likewise. Apples with a fair tannin content are desirable for cider. Commercial apple powder contains 1.4 per cent tannin and coloring matter.

Uronic Acids.—The so-called unavailable carbohydrates include the pectins which are responsible for jell formation on heating certain acid fruits with sugar. The pectin "nucleus" is galacturonic acid anhydride. The uronic acids related to glucose and galactose function as detoxifying agents in the intestinal tract and are essential in the synthesis of mucin.

The uronic acid concentration of apples and cranberries may exceed 1 per cent; commercial apple powder is reported to contain 9.2 per cent. Manville gives filtered lemon and tomato juices a uronic acid value of 0.2 per cent, filtered orange juice 0.4 per cent and winesap apple juice 0.5 per cent; (apples varied in uronic acid content from 0.7 to 1.6 per cent). The pectin content of a few varieties of apples is shown in Table 14.

TABLE 14.—**Pectin Content of Apples and Apple Powder.***

Variety.	Fresh apple, per cent.	Apple powder. per cent.
Jonathan	2.08	2.45
Winesap	3.12	5.33
Spitzenberg	4.27	6.07
Yellow Newtown	5.55	10.99

(100 grams of raw apple are required to make 15 grams of powder.)

Manville *et al.*: Canad. Med. Assn. Jour., **36**, 252, 1937.

Although apples undoubtedly offer the richest source of ... ily
ailable pectin, other plant foods contain notable amou... in pectin.
onic acid precursor. Currants are especially rich ... pedo (white
inces, green grapes, green gooseberries and citrous al... and
peel) are also satisfactory sources of pectin. Raspberri
e plums contain a little uronic acid, peaches and ripe strawberries
actically none. Although the jellying properties of vegetables ar
t encountered ordinarily, turnips, carrots, beets and other roots
e excellent sources of pectin. Tomatoes and rhubarb also contain
s substance in appreciable amounts. Tomato pomace has been
ported to yield 3.8 per cent pectin (McCay and Smith, 1940).
The animal sources of uronic acid are mucin and chondroitin.
e latter is found almost exclusively in the connective tissues.
eat products rich in this factor include head cheese, pickled pig's
t, spare ribs, joints and knuckles (Manville, 1936).

Less Common Food Acids.—In a review of the nut itional and
etabolic significance of certain organic acids, Smith a d Orten list
e occurrence of the less common food acids: *succinic* *id* in grapes,
ubarb, raspberries, cherries and blackberries; *m* *onic acid* in
rley, oats, wheat and alfalfa; *glyoxylic acid* in grap juice; *aconitic*
id in barley, maize, rye, wheat and oats; and *tric rballylic acid* in
rley and maize.

Eighty-five per cent of the acidity of blackberries is due to *iso-*
ric acid,

$$\begin{array}{l} \mathrm{COOH \cdot CH \cdot CHOH \cdot COOH} \\ \qquad\quad | \\ \qquad\quad \mathrm{CH_2 \cdot COOH} \end{array}$$

would appear that this acid, rather than citri , is the physiologi-
lly active agent in the tricarboxylic acid cycl wherein carbohyd-
te, protein and fat degradation products met during metabolic
anges (See p. 136). The rôle of citric ac d and its isomer in
trition is still only vaguely understood.

Although the existence of *benzoic acid* in cranberries, plums and
unes has been widely recognized, this is by no means the chief
id in these fruits. *Quinic acid* is found in both types of fruit to
e extent of about 1 per cent as against 0. per cent for benzoic
id. The fate of quinic acid within the body, however, is similar
that of benzoic acid into which it appears to be converted before
njugation with glycine for excretion as hip uric acid (Quick, 1931).
ague and Fellers found the benzoic acid ontent of 24 varieties of
anberries to vary from 0.029 to 0.098 per cent, with an average of
065 per cent. This concentration of benzoic acid is sufficient to
t as a preservative.

Salicylic acid, in the form of its methyl ester, occurs in apples, apricots, blackberries, cherries, Concord grapes, currants, oranges, plums, raspberries and strawberries (Hartmann and Hillig). Salicylic acid has also been reported in pumpkin. This acid apparently is excreted in the urine largely in unconjugated form (Quick, 1933).

The quantity of *sulfuric acid* in apple juice is considerable where large amounts of sulfate manure have been used as an orchard fertilizer.

Functions of Food Acids.—There is increasing recognition of the possibility that certain foods may possess specific physiologic effects apart from the provision of nutriments. The apple and banana, in particular, fall into this category and have been used in the prevention and treatment of diarrheal conditions and other intestinal disorders, especially in infants (Shields, 1939). Quoting from Kantor and Cooper: The criteria of ripeness in bananas are (1) skin which is entirely yellow and generously flecked with brown, and (2) pulp which has softened. At this stage practically all the starch has been converted into easily digested sugars. Attention should be called to the fact that in the ripening process the tip of the fruit is the last portion to show traces of green color. It may therefore be used as an indicator of fitness for consumption. Obviously, it is not correct to cut off the green portion and offer the rest of the unripe fruit to be eaten.

With some success pre-meals of bananas, oranges or apples have been employed to counteract gastro-intestinal disturbances (Bergeim, 1936). The procedure involves the ingestion of two bananas, for instance, ninety minutes before both lunch and dinner, and again before retiring. The high-banana diet results in a tremendous increase in the formation of butyric acid in the colon. This is one of the most toxic substances for yeast and B. coli. Dehydrated apple likewise promotes the growth of acidophilic organisms in the intestines by adjustment of the reaction of the medium. For summer diarrheas in older children and adults, Manville (1938) recommends 200 cc. of 8 per cent apple powder in water to be taken every two hours supported by a bland diet.

Scraped, raw apple is usually regarded as more effective than other forms of apple therapy. Birnberg (1933) employed 1 to 4 T. every one to two hours nothing else but water being permitted until formed stools appeared (generally within forty-eight hours). It is regarded as essential that the apple be unhampered in its action, whatever that may be, by the presence of other food, especially proteins. Manville, however, has used mixtures of apple and milk powders.

The effectiveness of the apple diet is attributed to pectin which takes up much water to providing bulk in a form which is relatively soothing to irritated membranes. The soft absorptive mass carries out bacteria which might otherwise cling to the intestinal walls. Pectin *per se* manifests this colloidal behavior but loses such properties on hydrolysis. The resulting galacturonic acid acts as a detoxifying agent. It is probable that pectin aids in the maintenance of

thy mucous membranes. Chemically it is related to glucuronic , the carbohydrate of mucin. Manville (1938) has suggested a relationship may exist between the functional activity of min A and these acids. Pectin may possess a specific healingr ·t in the gastro-intestinal tract judging by the investigations ow rnes (1937) and Thomson (1938) which indicate that pectinizeid sings are highly efficacious against infection and unhealth nulation in wounds and burns. for

ommercial preparations of pectin and pectin-agar have beors, ployed for treating diarrheas and dysenteries. These lack ated ingency of the apple (attributable to tannin) but are as effectriety etimes more so in the acutely ill. an in

ectins are useful also in the relief of constipation espe adds re coarse fiber is too irritating. The laxative action of the aking uently is ascribed to bulk obtained with roughage, buerman onsible component may be pectin rather than cellulose resum- e, 1936). The behavior of pectin in this regard is depss crept n its capacity for absorbing water and "lubricating" the se figure wall. rue, lists

ood acids may assist the stomach in its function as a bories (the terial invasion. This property is dependent upon an centration of hydrochloric acid. According to Manvi extensive ability to elaborate this acid does not reach a maxin the whole, age of twenty. Consequently, babies and very younat variance not have sufficient acid for the needs of digestion ane classifica- of the tract. Hot weather and fever are associated od of calcu- in gastric acidity. Once the adult passes the fort sphate ion is production of hydrochloric acid gradually dim. As shown eral reasons, then, the sterilization mechanism of ns of the ash stomach may fail. Alkaline foods and a pros of Berg and ecially interfere with this self-disinfecting proces power of phos- at a proportion of the available hydrochloric acid h contain little n to be excellent justification, therefore, for the o be considered t products with meats. other hand, in

he various fruit acids exert a highly beneficial ontent of calcium alimentary tract. The group as a whole is beli ivalent if there is etite. It is generally recognized that liberal a phosphoric acid, ts and vegetables should be provided in the d tly trivalent when ourse, that their vitamin and mineral conten neutralize all the too often the benefit of such dietary items must be considered lity to "alkalinize" the body. Undoubtedly insoluble salt with ls, malic and citric, are potential alkalinizeracid-base balance of y be emphasized to the exclusion of other re which is based on racteristics. Their rôle in the gastro-intest or sulfur and chlorine t been described, bears no relation to possiblrates the ash directly is dependent upon their acidity or upo theil originators of "ash"

Effect of Fruits on Calcium Retention.—Theons made in reaching on of the possibility that "intestinal acipproximations. Those ermining factor in the absorption of calcidic ash tadles, however, ure of the basal ration"—Robinson an figures.

known, acidity increases the absorption of calcium and phosphorus, whereas alkalinity retards or prevents it. After absorption, acidifying agents remove calcium and phosphorus from the body while increasing alkalinity favors deposit in the bones. Shohl observed that rickets could be produced on non-rachitogenic diets by the introduction of ammonium chloride and carbonate. On the other hand, the addition of citric acid and its sodium salt to rachitogenic diets prevented the development of rickets. This effect of [illegible] citrates was believed to involve more than the mere acid-base balance. Investigations by Mindell and co-workers indicate that [illegible]berries and, to a greater extent, apples increase body retention of calcium. Earlier, Chaney and Blunt had observed that orange [illegible] supplements to a normal diet resulted in greater calcium [illegible]ion. It would appear that the organic acids not only function as intestinal acidifiers but also play some rôle in mineral metabolism.

METABOLIC REACTION OF FOODS.

Formation of Mineral Residues.—Oxidation of food within the body [illegible] the formation of a *residue* or *ash*. When sodium, potas[illegible]ium, and magnesium predominate over sulfate, phosphate, [illegible]nd uncombusted organic acid radicals, they are designated "[illegible]e-ash" foods. Most vegetables and fruits are *alkaline* in [illegible] reaction within the body whereas meats, poultry, fish, [illegible]s, and cereals are *acidic*. It should be noted that a [illegible]" diet does not necessarily produce an alkaline residue. [illegible]ick has pointed out, a high-cereal intake may have a [illegible]ffect than an ordinary mixed diet. From the standpoint [illegible]archy foods fall into two groups: (1) Cereal and grain [illegible]h yield acid substances on oxidation; and (2) tubers [illegible]ch produce an alkaline reaction. The banana is an [illegible] fruit. The legumes, except peanuts and lentils, are [illegible]l as potential alkalinizers. Since the mineral content [illegible]re fats and pure carbohydrates is negligible, they [illegible]*utral-ash* substances. Such foods include tapioca, [illegible]yrups, cream, butter, etc.

[illegible] *a food as ingested is no criterion as to the ultimate* [illegible]*-base balance of the body.* When foods are ashed [illegible] some show a strongly alkaline reaction whereas [illegible]y neutral ash. This residue gives no clue as to [illegible]e substances lost through volatilization. Since, [illegible] elements are retained in the ash, a neutral residue [illegible] preponderance of acid-forming constituents in [illegible]ur, which exists chiefly in protein combination, [illegible]elled during ignition. The sulfate of the ash [illegible] small part of the food sulfur. If the base-[illegible]dominate, loss of acid-forming elements is [illegible] obtain numerical values for food "ash" it [illegible]e the concentrations of the various elements [illegible]hem in terms of equivalents, and to express

the excess of one group over the other as cubic centimeters (or milli-equivalents) of normal acid or base per 100 grams of edible food material. Such figures are referred to as *degrees of acidity or alkalinity*. Since this involves an enormous amount of painstaking analytical work, accumulation of data has been limited to a few investigators, notably Sherman in this country, McCance and Widdowson in Great Britain, and Berg in Germany.

Evaluation of Mineral Residues.—Although numerical values for acidic and basic ash foods are stated by various American authors, credit for the data is ascribed to Sherman with only a few isolated exceptions where special analyses were made. Considerable variety appears in the literature due in part to the fact that Sherman in various editions of his text-books deletes certain items and adds others. Liberties also have been taken with the intention of making the Sherman data more widely applicable. Waller credits Sherman (1916 and 1928) with her information but presents items presumably arrived at by calculation. Other values have doubtless crept in through error, notably that of Sansum and Bowden whose figure of 30 for oysters has been widely quoted; Sherman, it is true, lists oysters at 30 degrees of acidity but on the basis of 100 Calories (the correct figure is 15 per 100 grams).

Since the method of computation is the same, the recent extensive tabulation of McCance and Widdowson compares well, on the whole, with Sherman's analyses. Berg, however, is frequently at variance with the American data even to the point of altering the classification. Part of the difference is dependent upon the method of calculating the acidity equivalent of phosphorus. The phosphate ion is considered trivalent by Berg and divalent by Sherman. As shown by Davidson and LeClerc, the stoichiometric relations of the ash constituents should occupy a place between the figures of Berg and the less acid ones of Sherman, since the neutralizing power of phosphoric acid varies with the base. In cereals (which contain little calcium or magnesium) the phosphate anion ought to be considered partly monovalent and partly bivalent. On the other hand, in vegetables (which generally have a relatively high content of calcium and magnesium) this anion should be treated as trivalent if there is enough of these bases to combine with all the phosphoric acid, and partly monovalent, partly bivalent, and partly trivalent when there is not enough calcium and magnesium to neutralize all the phosphoric acid. The sulfur content likewise must be considered in this connection, since it forms a relatively insoluble salt with calcium. A new method for determining the acid-base balance of food has been offered by Davidson and LeClerc which is based on the direct titration of the ash with corrections for sulfur and chlorine lost during the combustion. Frear also titrates the ash directly after treatment with magnesium nitrate. All originators of "ash" data recognize the extent of the assumptions made in reaching numerical values which, at best, are only approximations. Those who are interested in using alkaline and acidic ash tadles, however, are often unaware of the real nature of the figures.

In Table 67 (Appendix) are shown figures for the acidity and alkalinity of the ash of many foods and beverages. These values should be used, if at all, with the greatest discretion. It is seriously doubted that they should be employed (as does Higgins, p. 574) for the computation of diets. It is, however, our opinion that the Higgins' diets are capable of doing no harm whereas this is not necessarily true of the strict acidic or alkaline-ash diet.

It is interesting to note that this tabulated data from the literature shows macaroni, whether cooked or raw, as acidifying. Cheddar cheese also rates an acid ash, yet "macaroni and cheese" as served is found to give an alkaline ash. Although cheese is usually listed as acidic, Gruyère and Parmesan are reported as leaving an alkaline residue. Raw peas give an alkaline ash, but when cooked or canned are acidic. An English apple pie is metabolically acid, an American one alkaline. An English rice pudding is alkaline, an American one with raisins (a highly "alkaline" food) is reported to be acid! Rusk, which might be thought to fall into the same category as bread or Zwieback, is found to be alkaline, as is German pumpernickel bread. Boiled Swiss chard (sea-kale) is acid and fried smelts alkaline. Cream of pea and tomato soups are alkaline, but potato soup is acid. It is all very confusing if taken too seriously.

Specific Value of "Ash" Constituents.—Too often acidity or alkalinity of the ash is the only criterion applied to a food. It is apparently forgotten that those elements which are responsible for the character of the ash have specific functions within the body. Since the body continually requires replenishment, it must discard what it has used or what it cannot use. It is possible to be so intrigued with balancing the acids and bases discarded that the purpose of the source material is completely ignored. It is for this reason that attention is directed to the ash constituents as individuals. The conventional classification is shown in the following:

Group I. *Acidic-Ash Foods.*	*Group II.* *Neutral-Ash Foods.*	*Group III.* *Alkaline-Ash Foods.*
Meats, fish, poultry	Butter	Fruits, except as shown
Eggs, cheese	Cream	Vegetables
Cereals	Cooking fats	Milk
Nuts (filberts, peanuts, walnuts)	Starches	Nuts (almonds, brasils, chestnuts, cocoanut)
Cranberries, plums, prunes	Sugars, syrups	

A diet confined to any of these lists is generally regarded as nutritionally unsatisfactory because it is deficient in recognized essential constituents to be found in the other groups. A well-rounded diet demands foods listed in all three.

In computing the acidity or alkalinity of the diet *from the standpoint of ash*, the chemical separation is as follows:

Acid elements —Cl, S, P.

Basic elements—Na, K, Ca, Mg.

Acid Elements.—Although *chlorides* are found in varying concentration in natural foods, salt added at the table or in the processing of the viands constitutes the major source of this element. Inasmuch as sodium chloride retention or loss involves a comparable

ount of water and those mineral constituents which participate osmotic equilibria, it is not without effect on the acid-base bal-e of the tissues, but this is a matter controlled by use of sodium oride as such and is not concerned with the dietary residue as inarily construed.

ulfuric acid is almost entirely derived from protein. Peters Van Slyke have calculated that the ingestion of 100 grams of tein results in the metabolic release of H_2SO_4 equivalent to 600 cc.).1 normal acid. Base must be provided for neutralization. The tamines (found in sperm cells) are the only proteins which do contain sulfur. Regardless of the selection of meat, cereals, etables or dairy products sulfur is present. More than one ter has hazarded a guess as to protein requirements. While it is bably true that 25 grams of especially selected protein may et the body's minimal need, conservative authorities still recom-nd three times that amount "to be on the safe side." The con-uences of indiscriminate restriction of protein intake during the t two decades do not encourage the physician to lower the dietary tein merely for the sake of diminishing urinary sulfate excretion, ticularly since these sulfates do not affect the urinary acidity.

n nature, potassium and sodium are usually combined with orine and sulfur to form neutral salts. Hence acidity or basicity ood ash is often determined by the ratio of its calcium and mag-ium to its *phosphorus*. Phosphorus is a highly desirable element the diet. It is ingested as inorganic salts, phosphoproteins, leoproteins, phospholipins, and phytins. Certain phosphorus npounds are less available than others. A variable amount (20 60 per cent) of ingested phytins (calcium-magnesium salts of sitolhexaphosphoric acid) are excreted unchanged. The fate of remainder is obscure. On the average, 97.5 per cent of the osphorus of animal origin is utilizable. Where cereals constitute a ge part of the dietary, the total phosphorus content is a wholly orrect guide as to the available phosphorus. A diminished osphorus intake is nutritionally not desirable although the foods n which it may be derived are subject to wide choice.

Basic Elements.—In plant foods there is an excess of potassium r sodium rendering many of them (such as the potato) unpalat-e to the average taste (not wholly an acquired characteristic) ess sodium chloride is added. Both *sodium* and *potassium* are ded in the diet so that the body may maintain the proper ratio these elements in its tissues. No diets (except possibly those of reme faddists) are apt to be deficient in either of these bases.

Magnesium occurs in ample amounts in the average diet. No erimental data are available on the optimal intake of this element. ninished blood magnesium has been reported subsequent to a t of milk and refined cereals. There appears, however, to be no asion in the light of present knowledge to concern ourselves over gnesium. No special dietary precautions are needed for any of bases except calcium which all too often is consumed in sub-nimal amounts.

The richest source of wholly assimilable *calcium* is to be fo in the rennet cheeses, which by reason of their protein cont must be grouped with the acidic-ash foods. Spinach was o rated high in "alkalinizing" value (Sherman has deleted the fig from his later works, 1935) and as a good source of iron and calci Today it is recognized that its calcium is useless and that its oxal concentration results in squandering calcium from other sour If this element is to be efficiently utilized, additional dietary lact and citric acid are desirable since they favor absorption by form soluble non-ionized compounds (Nordbö, 1939). Also, vitamin and D should be adequately supplied together with calcium-r foods. It will generally be conceded that on an acid diet m calcium is required for maintenance than on an alkaline diet, b the acidity of the intestinal tract is as important in calcium meta olism as is the acidity of the urine.

Organic Food Acids.—The results of ash analyses do not necessar demonstrate the effect of organic acids since their fate in the bo depends not only upon their nature, but also upon their concentr tion and alimentary environment. Combustion of organic ac leads to the formation of carbonates in the laboratory. Un physiologic conditions, malic and citric acids are readily convert into carbonic acid but benzoic and related acids (as quinic) proba cannot be metabolized at all. Although cranberries, prunes a plums give an alkaline ash *in vitro*, a portion of their organic ac appear in the urine as hippuric acid; thus, they are urinary acidifie A variable portion of tartaric acid results in an alkaline resid According to Sherman (1937) this acid is not oxidized at all in t body despite the fact that only a small fraction of it appears in t excreta; it is presumed that potassium acid tartrate is attacked the gastro-intestinal tract with the formation of potassium bicarb nate which may be absorbed and render the urine less acid. T metabolism of other acids, such as oxalic, is more or less obscur It should be recognized that oxalic acid is readily converted in carbonate *in vitro* but not *in vivo*. It therefore contributes to t alkalinity of the "ash" without being available as an alkalinizer the body.

Organic acids occur in foods both free and as salts. When the "burn" to CO_2 and H_2O, they leave no solid matter to be excret except the base with which they may have been combined. T base then enters into a new combination with tissue constituents with acids claiming excretion by the kidneys. Those foods whi provide these organic acids are highly desirable but their val probably far exceeds their "alkalinizing" property. The fruit a vegetable acids are being assigned increasingly extensive rôles physiologic processes (see p. 140). Many of the benefits accredite to an alkaline ash régime may be dependent upon other facto The acidifying fruits (cranberries and prunes) share this credit wi the alkalinizing plant foods.

Metabolic Acids.—Metabolic processes result in the formation sulfuric, phosphoric, hydroxy (as lactic), keto, (as diacetic), oxal

nd uric acids. Normal kidney function adequately provides for the emoval of sulfuric and phosphoric acids. *Hydroxy* and *keto acids* re combusted in the presence of suitable amounts of glucose simulaneously undergoing oxidation. Deliberate planning may lead to etogenesis, but it should be stressed that *ketogenic acidosis is a natter of available glucose—not alkaline-ash foods.* This type of cidosis is caused by improper balance between the fats and pure arbohydrates both of which are classed as neutral-ash foods. This bove all demonstrates the folly of trying to avoid an "acid condiion" by securing an excess of alkaline-ash foods over those of cidic ash.

Oxalic acid has been discussed elsewhere (p. 137). *In vitro*, this cid on subjection to heat is converted into carbonate. Thus, it nay be responsible, as in the case of spinach, for a high alkaline-ash alue. This is almost wholly misleading, since there is no guarantee hat any of the oxalate will become carbonate in the body. Food xalates, when absorbed, tend to be eliminated as such in the urine.

The amount of *uric acid* which is excreted through the kidneys aries considerably. It depends upon the purin content of the diet, he nature of the non-protein foods ingested, physical activity of he subject, the destruction of uric acid in the body, and renal fficiency. Uric acid excretion on a purin-free diet is augmented emporarily by a high-protein or a carbohydrate-rich diet. A highat diet and ketogenesis lead to uric acid retention. Uric acid not nly can be synthesized by the body, but also can be destroyed. Proteins and carbohydrate aid, whereas fats hinder its destruction. Faddists have seen fit to attribute great merit to the alkaline-ash liet in aiding the body to combat the "evil effects" of uric acid. t is true that after the eating of vegetables and fruits (especially otatoes, bananas, carrots, melons, strawberries, tomatoes, rhubarb) he urine is not likely to deposit uric acid, whereas after bread and neat meals the urine may precipitate uric acid crystals. This is egarded by some as ample reason for instituting an alkaline-ash liet, but it is only part of the picture (see p. 156).

RELATIONSHIP BETWEEN URINARY REACTION AND FOOD.

It is assumed that ingestion of certain foods leads to excretion of cid or alkaline urine according to the fundamental chemical nature f those foods. Unfortunately, the relationship is not quite so simple. The urine reaction, for many reasons, may fail to correspond to redictions. Experiments which purport to classify foods on the asis of subsequent urinary response may provide misleading infornation if the results are attributed solely to the ingesta.

Acid-base Rhythm.—The normal individual experiences a variaion in urinary pH such that definite decrease in acidity occurs at ome time between 9.00 A.M. and midnight. Most frequently this is een during the morning and is described as the "alkaline tide." The urine may or may not become actually alkaline. This tide sually is attributed to the ingestion of a meal. Actually, the im-

mediate response to food is more apt to be increased rath decreased urinary acidity. The determination of urinary p lowing meals is of no practical clinical value. Contrary t statements in the literature, the urinary acidity is no ga gastric acidity nor is absence of the morning "alkaline tide dence of pathology.

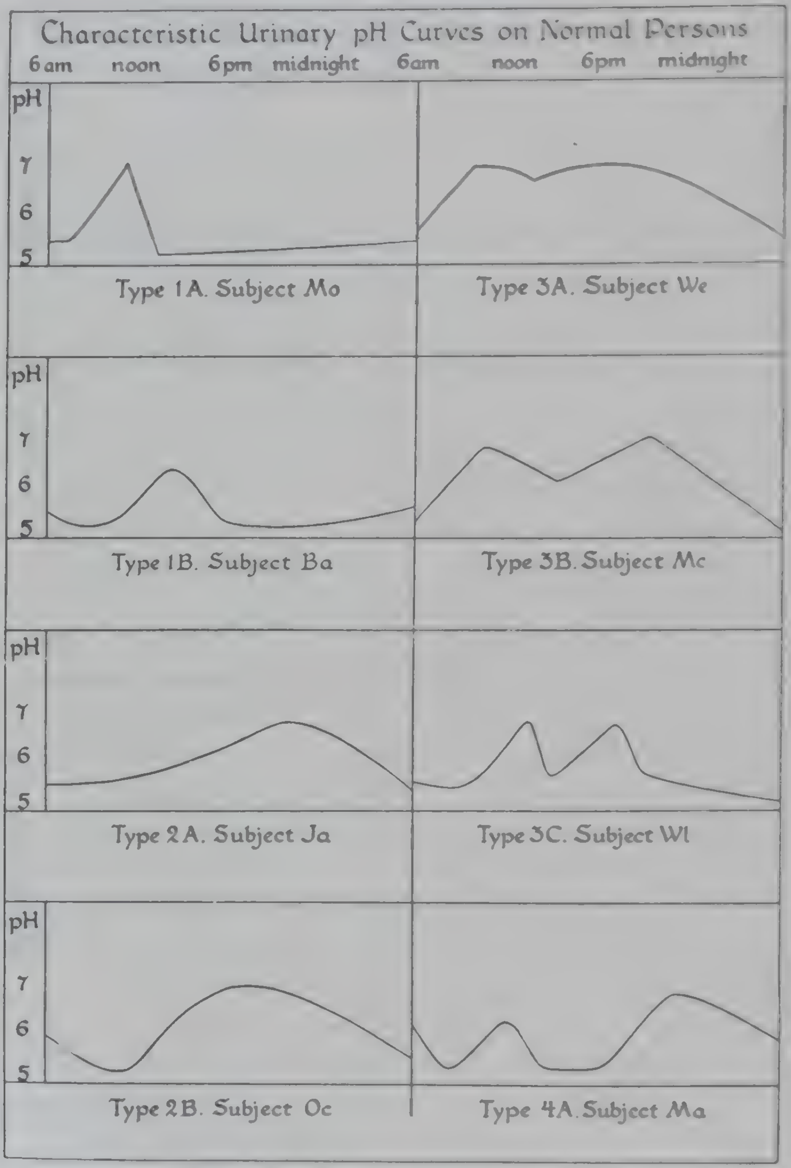


CHART 1.—Typical urinary pH curves representing the fundamental acid-base rh of various subjects.

Too frequently the reaction of the urine in nutrition studi taken on a mixed twenty-four-hour specimen or on single sam collected as much as a week apart. These reveal little about b processes. The chief characteristic of normal urine is the va bility of pH throughout the twenty-four hours. Fixation of pl as undesirable as fixation of specific gravity. It is often difficult even impossible to force the urine to remain at a predetermined l whether drugs or food be used. When pathologic processes fix

urinary pH, it is likewise difficult to alter the reaction; an attempt to do so may have serious consequences.

There is ample evidence for the existence of a natural acid-base rhythm (Chart I) which is the resultant of manifold factors. This rhythm tends to manifest itself despite efforts to alter it. If it becomes therapeutically advisable to hold the urine reaction within certain limits, this can be consistently attained only by ascertaining beforehand what the patient's natural trend is. Examination of a group of individuals will reveal that each presents a specific picture. From observed pH curves (8 to 10 specimens per twenty-four hours) it appears likely that some will readily respond to acidification but not alkalinization and *vice versa*. Where only 1 or 2 specimens reach pH 6.5, it will usually be comparatively easy to lower these values by acidification measures. Where only 1 or 2 specimens fall below pH 6, it will be comparatively difficult to induce greater acidity, especially with foods. Furthermore, those persons who generally excrete a "morning urine" in the neighborhood of pH 5 are more than apt to continue to do so even though placed upon a strict, alkaline-ash diet. It is probable that alkalinity at this hour will require dosage with sodium bicarbonate at bedtime. Except in the face of demonstrable necessity, such a course is to be condemned. With our present state of knowledge it is conceivable that deliberate alteration of urinary pH may not be in the best interests of the patient.

As has been pointed out by Ziegler and Brice (1937), the human kidney is phylogenetically adapted to excrete an acid urine. Their statistical studies demonstrate that "the ability of the kidney to excrete solids and to concentrate the urine is greater when the urine is acid than when it is alkaline or neutral." According to v. Noorden (1934), a long-standing surplus of bases in the food is an obstacle to the elimination of those products of metabolism normally excreted in the urine.

The body is equipped to handle far more acid and base than is ever encountered dietetically. It is, on the whole, better adapted for the excretion of acid than of base, although the diversion of bicarbonate from its usual path of elimination in the expired air (as CO_2) to excretion by the kidneys (as $NaHCO_3$) does rid the body of much alkali. It must be stressed, however, that carbonic acid is not a usual urinary constituent and shifting the diet of the normal individual to accomplish this purpose is not entirely rational. Any effort to force elaboration of an alkaline urine is bound to be beset with difficulties. It is impossible to excrete a continuously alkaline urine without resorting to large doses of such agents as sodium bicarbonate (excepting in nephritis with fixation at the turning point of litmus or in urinary infections with persistent ammoniacal fermentation).

Alteration of Urinary Reaction.—The extent of urinary pH change desired, naturally, affects the selection of method for its alteration. There are many instances in the practice of medicine where general indisposition or specific complaints can be met with an altered dietary regimen. Those with a predilection for alkaline-ash foods

will derive benefit from acid-producing foods, and *vice versa*. Wh changes in reaction are contemplated, it should be remembered th forcing fluids tends to raise the urinary pH while withholding wat lowers it. If the prescription of an alkaline- or acidic-ash diet for metabolic purposes only, then no specification as to fluid intak is needed. If, however, the object is alkalinization or acidificatio of the urinary tract, the fluid allowance must be specified.

The ketogenic diet is not well tolerated by the majority wh require definite acidification. The use of acidic-ash foods is mo effective in the long run. As ordinarily applied, such a diet no infrequently fails to lower the urinary pH below 5.5 which is held t be the upper limit for combating infection. This is due not only t the characteristics of the individual's natural acid-base tide, but als to lack of strictness in arranging the diet.

The absence of salad and cooked greens from the acidic-ash die may be distressing to the patient. Such greens may be allowe once daily if ample amounts of cranberry, plum or prune juice ar taken to the exclusion of other fluids. Lactic acid milk may be substituted for the fruit juices. Ice-cream is permissible on both acidic- and alkaline-ash diets. On any acidification regimen, provision should be made for adequate intake of calcium unless urinary calculi exist. When cheese is tolerated, this item is invaluable; the rennet cheeses are ten times richer in calcium than those produced by acid coagulation. Since the acidic-ash diet is notably deficient in vitamin C, administration of ascorbic acid (50 to 100 mg. daily) is advised.

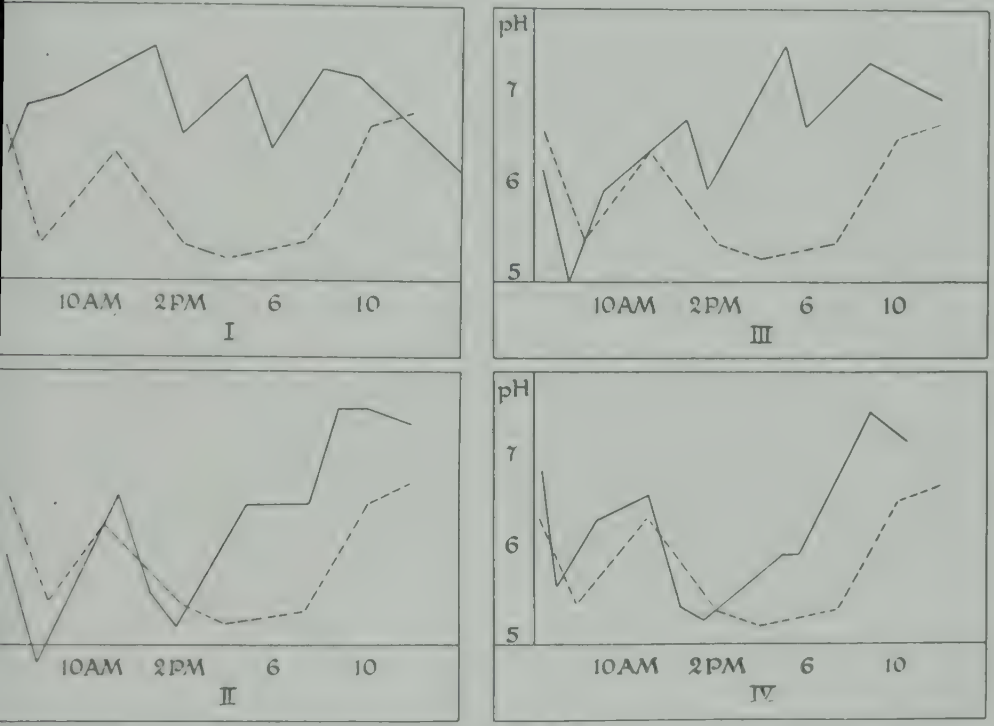
The more common drugs for acidifying urine include sodium acid phosphate (average dose 10 to 30 grains), sodium benzoate (average dose, 15 to 30 grains), ammonium chloride (average dose, 15 grains, in amounts up to 120 grains daily) and ammonium nitrate (dosage as for ammonium chloride). Ammonium or monoethanolamine mandelate (10 to 15 grains in amounts up to 180 grains daily) is employed for acidification and for its bactericidal effect. When used in conjunction with ammonium chloride, 10 grains of the former and 7 grains of the latter are usually given t.i.d. Mandelic acid is without effect unless a concentration of 0.5 per cent is reached in urine of pH 5.3 or less.

Whenever a patient is kept at a low urinary pH for several days, the production of ammonia gradually raises the pH level. Acids previously excreted free are eliminated as the ammonium salts. Once this physiologic adjustment sets in, it would seem logical to discontinue the diet or drugs used to achieve acidification. Usually this takes about five days.

Temporary elevation of urinary pH is most readily accomplished dietetically with cantaloupe. Unlike most of the fruits which are ingested as acid although they give an alkaline ash, cantaloupe is close to neutrality (see p. 738). No other food appears to be capable of raising the pH so promptly to such a high level (7.2 to 7.8), yet its "ash" is not outstanding (7.5 degrees of alkalinity). The cause of this behavior is not evident. Bananas, pears, and apples are also well suited to raising the urinary pH.

The results of four consecutive days of an exceedingly strict alka-e-ash diet are depicted in Chart 2. The usual pH curve is unrecnizable the first day, due largely to cantaloupe at breakfast and ich. On the second day, when the fruits consisted of banana and ir, the outline of the "natural" curve begins to appear. Cantape at lunch on the third day completely distorts the afternoon rtion of the curve, but when this fruit was not eaten until the ening meal on the fourth day, the fundamental curve is readily parent.

On alkaline-ash diets the withdrawal of cereal products may contute a hardship in which case two slices of bread may be allowed ily. Where soybean or lima bean flours are available for the eparation of bread substitutes, no such restriction is necessary. lless contraindicated, an egg should be included every day except ere the diet is of short duration.



ART 2.—Urinary pH changes on an alkaline-ash diet. - - - - - - average "normal" curve; ——— changes encountered on specified day of diet.

When it is impractical to alter a mixed diet, Shohl's citrate solun may prove useful. This consists of 20 cc. of molar citric acid 10 grams $H_3C_6H_5O_7.H_2O$ per liter) plus 30 cc. of molar citrate (294 ams $Na_3C_6H_5O_7.2H_2O$ per liter). Although the pH of this mixre is not unduly acid, the citrate is so concentrated as to require ution of five to ten times for ingestion. Milk can be used as a hicle although water is usually more convenient. As dictated by natural acid-base tide of the patient and the response to the rate, this mixture is administered in the amounts needed for calinization of the urine. In accordance with individual preference can be taken before, after or during meals.

Alkaline mineral waters shift the urine reaction in proportion to their basic content and the degree of diuresis produced (McClellan and Goldstein, 1938). To maintain continuously alkaline urine, 45 grams of sodium bicarbonate may be required daily (Best and Taylor, 1937). Palmer and Henderson employed sodium bicarbonate therapeutically in 4-gram doses three or four times a day, preferably between meals, until the urine was slightly alkaline; then it was maintained with a smaller dose, usually not more than 4 grams per day. Alkali sufficient to raise the urine reaction above that of blood should not be permitted lest a well-marked albuminuria develop.

If the urine does not respond promptly to acidification or alkalinization measures, these should be discontinued. In the presence of diminishing renal efficiency, it may become impossible for the patient to excrete a markedly acid urine, thus leaving the acidifying agents to accumulate in the blood. On the other hand, some persons with presumably normal kidneys cannot readily rid the body of excess base. Alkalinization procedures then lead to alkalosis and, at times, some degree of renal impairment.

In restricting water for the sake of concentrating the urine, it is not advisable to deprive the body of necessary fluids. The patient should not be allowed to develop a real thirst. Although a highly acid, concentrated urine is inimical to bacterial growth, occasions may arise where ample flushing of the urinary tract is more desirable. It is suggested that this be achieved by free ingestion of cranberry and prune juices so long as no gastro-intestinal disturbance ensues. Although the ingestion of small amounts of grape juice is associated with increased urinary alkalinity, the drinking of large quantities may result in diuresis with low pH. Grape juice, therefore, may be offered whenever the patient refuses the cranberry or prune juice. Unless accustomed to the "burnt" taste of commercial prune juice, the patient is apt to find it objectionable; when prepared in the kitchen, the flavor is superior and the fluid usually is acceptable.

Purpose of Acidic or Alkaline-ash Diets.—Change in the reaction of the urine may be sought to benefit local conditions in the urinary tract (as infections or calculus formation), to provide "evidence" of readjusted metabolism and "normalization" of body processes (a fertile field for faddists), and to afford a means of gauging response to the therapy of diseases. There is no widespread agreement on any of these points, interpretation of experimental data, such as it is, being subject to no end of assumptions. The broadcasting of ill-substantiated opinions and hasty conclusions as well as sound fact have confused both the lay and professional point of view.

To quote from Mason and Hellbaum* (1938): "Many physicians make a routine practice of prescribing alkalies, and also alkali diets, in the treatment of **nephritis**. They usually do so with no better reason than 'if it does not benefit the patient, it can at least do no harm.' Also the general public has been 'sold' on the idea that all human ills result from a 'too acid' condition, and the panacea is

* Ann. Internal Med., 11, 2206

ali. Berger and Binger have observed impaired renal function ompanying alkalosis, resulting from the alkaline treatment of tic ulcer. Steele has also observed that renal damage may ur in the alkaline ulcer treatment before clinical symptoms of alosis appear . . . Ziegler and Brice warned against the iscriminate use of alkalies, as alkalinization of the urine may eat the purpose, which is elimination of solids." Acid urines show er abnormal findings than those which are alkaline or neutral. Many find the acid type of therapy superior to the alkaline in naging nephritis. Lashmet's (1931) treatment of nephritic edema sists essentially of a low-protein, salt-poor, neutral-ash diet in junction with acid-producing salts and forced fluids. However, diet in nephritis invariably needs to be adjusted to the capacity he kidneys for handling waste products.

Alkalinization should be attempted only with definite justifica- n. Where extreme acidity is accompanied by frequency and dis- nfort, relief may be expected by inducing reactions close to trality. There is no merit in achieving a continuously alkaline ne. It is of no benefit to the kidneys—rather the reverse. eglitz has demonstrated that the formation of neutral urine is ociated with secreting cells of similar reaction; acid or alkaline ne, however, is accompanied by intracellular changes of opposite ction. Alkalinization of urine, therefore, causes increasing acid- in the renal cells. Acidity is observed in damaged kidney tissue alkalinization of nephritic animals does not reverse the cellular dity.

Paradoxically, **diuresis** may follow either acid or alkali therapy. eglitz has offered an explanation based on experimental observa- ns. Reversal of intracellular reaction may produce physiologic tation and thus renal diuresis by insult attributable to alkali. On other hand, diuresis associated with the use of acids in nephritis bably results from some measure of physiologic neutralization of renal secreting cells, thus improving their functional efficiency. An acidic diet is dehydrating whereas marked and sudden gain in ght follows the administration of sodium bicarbonate. Not only edema but also in epilepsy and in **obesity** may advantage of this t be taken. Subcaloric diets do not always lead to the expected s in weight. Prompt elimination of water and consequent weight uction are encountered with acid formation and a low-salt intake.

The So-called Acid-Ash Acidosis.—Ingestion of foodstuffs has er produced sustained changes outside the normal limits of the sma pH or bicarbonate of human beings. Bischoff, Sansum *et al.* 34) found no significant difference in the acid-base picture of mal individuals fed exclusively acid or excessively alkaline food- ffs. The daily administration of 45 grams of sodium bicarbonate 15 to 20 grams of ammonium chloride is needed to raise or lower plasma pH by 0.2 (Haldane, 1921). To accomplish this same ct by food, 18 pounds of oranges would be required in the diet one time for the shift toward alkalinity and 4½ pounds of lean f for the shift toward acidity produced by the specified drugs

(citations from Tobey, 1936). Daily ingestion of 2.5 grams of phosphoric acid (equivalent to 1 pound of lean beef) for six weeks has not been found to disturb the acid-base equilibrium (Michalowsky, 1930). *The American Public Year Book* for 1935-1936 (p. 60) states very flatly that "there is no evidence that a preponderantly acid diet is injurious."

Alkalinization for Transfusion.—Hemoglobinuria subsequent to transfusion was found by McGowin *et al.* (1937) to be associated with renal impairment in dogs due to blockage of the tubular lumen with masses of pigment although the transfused blood was compatible. Partial or complete urine suppression occurred on acid diets, but so long as the urine was alkaline intravenous injection of large amounts of dog hemoglobin appeared to be innocuous. If these observations can be applied to human subjects, it would be logical to use alkalinizing measures as a prophylactic prior to transfusion.

Acid versus Alkaline Starches in Dental Nutrition.—The Hawaiian investigations of Jones, Larsen, and Pritchard are of extraordinary interest in relation to the development of sound teeth and fine physique. Quoting from their 1934 report:* "The Polynesians throughout the Pacific area have from time immemorial been large consumers of carbohydrate foods—roots and tubers. It is estimated that from 60 to 75 per cent of the calories of the diet of the old Hawaiians were in the form of taro root and sweet potato. Fish furnished the protein of their diet. They did not use milk, beef or grains. Their diet was not only rich in carbohydrate, but soft and pappy in consistency; yet throughout the centuries these people maintained their fine physiques, broad dental arches and freedom from tooth decay. The introduction of grain foods in the tropics and their substitution for roots and tubers have been accompanied by an increase in the incidence of respiratory and blood-vessel diseases. In spite of their splendid heritage, the teeth of Hawaiian babies of today are often ravaged by decay before they completely erupt. The *type* of carbohydrate in the diet, rather than amount, appears to be the important factor in maintaining sound teeth in Hawaii."

"Honolulu has enjoyed daily for the past twenty-five years an average of seven and one-half hours of tropical sunshine, the richest known source of vitamin D; yet during that time the incidence of dental decay has increased rapidly. Eggs, which are also rich in vitamin D, are a common article of food today. Cod-liver oil was used systematically in the baby clinics, kindergartens and schools for years without any detectable beneficial effect upon the teeth of the children. The conclusion is inevitable that vitamin D in large amounts under conditions existing in Hawaii does not prevent or arrest dental decay."

"*The different effects of various types of foods on man in different parts of the world are due, we believe, to differences in food requirements which are to a great extent determined by climate and activity as well as age and systemic condition.* The human race subsists

* Dental Cosmos, **76**, 395, 1934.

-ly on carbohydrate foods—roots, tubers and grains. As has pointed out, roots and tubers are indigenous in the tropics and n foods in the temperate zones. Though they are generally rded as interchangeable as sources of carbohydrate, they should be, because roots and tubers act as an alkali when they are ned in the human body, and are needed, apparently, to balance physiologic effect of a warm climate. Grains, on the other hand, l an excess of acid elements which are well tolerated in cold ates, but in the tropics create an imbalance in the systemic plex toward the acid side. Neither grain foods nor potatoes in the arctics, and man thrives best in the extreme and habitual when he subsists on flesh foods. The introduction of grain s into the arctics and tropics has been associated with physical rioration of the people, an increase in the susceptibility to dis-s of all kinds and increase in the incidence of dental decay."

There are large regions throughout the temperate zones where n foods have from time immemorial been the principal carbo-rate food—the 'staff of life'—of millions of people. In cold nd districts the vitamin D content of the diet is probably low, as in Russia and North China, where wheat grows luxuriantly constitutes the principal food of the people. Those who subsist native foods are said to be physically strong and their teeth free n decay. The association of dental decay with grain foods the ld over may be due, not to a fault, as such, in the grains, but to r excessive use out of their natural habitat."

herapy for Nephrolithiasis.—No subject is more complicated by troversial opinion than the treatment of renal lithiasis. Dietary ciency, bacterial infection, and metabolic imbalance all have n assigned an etiologic rôle. In any event, the diet holds a spicuous place in the therapeutic regimen. Much emphasis has n placed on urinary acidity or alkalinity. Restriction is imposed n the offending "element" as revealed in analysis of the calculi. believed that by juggling various urinary constituents recurrence he stone can be avoided.

'rinary solubility, unfortunately, is but vaguely understood. tain facts regarding the colloid stabilizers are brought out by and Toenhart (1937). These little known substances, said to ur in amounts varying from 0.2 to 0.8 gram per liter, can be zen, boiled, or gently evaporated without alteration of their perties. Temperature does not affect the solubility of crystal-s in urine to the same extent it does in ordinary solutions. tein and carbohydrate stimulate colloid excretion whereas fat s not. Fasting increases the urinary colloids and more is ex-ed during the day than at night. Solubility also depends on presence of many salts and organic substances, as urea, and n the degree of acidity. Obviously, urine is not a simple eous solution to which the terms "saturated" and "super-urated" can readily be applied.

'ric acid requires in excess of 16 liters of water at body tempera- to dissolve 1 gram. The sodium and ammonium salts are

somewhat more soluble. Yet the kidneys may eliminate as m as 2 grams of uric acid without precipitation in a volume less th 1 liter. Presumably it is either present as a colloid or is stabili by certain colloids. The stability of colloidally protected uric a has a sharp optimum between pH 5.5 and 7 (Schade). With these limits urates may "stubbornly remain in solution." On t other hand, much smaller quantities of urates may fail to be excret without precipitation, the pH of the urine not accounting for th phenomenon. The missing factor may or may not be one of t urinary colloids.

One of the reasons commonly advanced for embracing an alkalin ash diet is the possibility of precipitating uric acid with the suppos attendant danger of calculus formation. If avoidance of urinar sediment is a worthy aim, then increasing alkalinity or diminishin acidity will hardly achieve that end. *An effective alkaline-ash di is an excellent means of being sure that the voided urine will not b clear.* Rarely is alkaline urine clear; not infrequently it is heav with sediment. On the other hand, the majority of acid urines ar clear when voided. If an acid urine is extraordinarily conduciv to uric acid precipitation, evidence should be easily obtainable Tabulation of 1000 routine urinalyses submitted during the cours of a month at the New York Post-Graduate Hospital revealed 73 which were acid in reaction. Of these, only 17, or 2.3 per cent showed a deposit of uric acid. On a vegetable and fruit diet, the neutral or alkaline urine which reaches the bladder is already turbid with precipitated phosphates. There is no reason for believing that a phosphate sediment is any less harmful than a lateritious deposit, especially since the most intractable stones are phosphatic.

Out of 201 urinary calculi analyzed by the author only 31, or 15.4 per cent, contained uric acid. Calcium oxalate was encountered in 52 per cent of the stones. In over one-half of the oxalate uroliths phosphate was present in considerable quantity. In 163, or 81 per cent, of these calculi phosphate occurred in appreciable amount. Our experience confirms the opinion of Joly that oxalates or phosphates predominate in the majority of stones.

Oxalic Acid.—From the foregoing it can be seen that urinary oxalates cannot be ignored. Although it would be simple to tabulate the occurrence of calcium oxalate crystals as has been done with uric acid, it is believed that any such data would be misleading. It is a matter of common observation that calcium oxalate sediments will appear in the urine of nearly every patient in a ward after ingesting oxalate-rich food, as spinach or rhubarb. This never happens with uric acid, but may do so with phosphates. Statistical treatment of microscopic urinary findings, then, would merely reflect the diet in the case of oxalate and, to some extent, phosphates. Both are very common urinary sediments. That they should occur frequently in calculi is not surprising. The point to be stressed here is that alkalinizing diets lead to phosphate precipitation. If a tendency to stone formation exists, turbidity is most unwelcome.

s not possible for the kidneys to excrete urine acid enough to dis- calcium oxalate, crystals of which may appear in alkaline, neu- r acid urine. Although persons who have passed oxalate stones be placed upon an oxalate-low diet, the urine frequently con- s to show oxalate crystals. It is probable that calcium, r than oxalate, is the offending agent. In some instances, patients exhibit a high serum calcium (12 to 14 mg. per cent) excrete unduly large quantities of calcium through the kidneys, n usually is exaggerated by acidifying measures or increased ability of vitamin D. In the opinion of Flocks (1939) when- an acidic-ash diet, moderate doses of vitamin D or heliotherapy t in excessive urinary calcium excretion, these agents should e employed in the treatment of patients with calcium urolithi- The acidic-ash diet is safe only for those who excrete normal nts of calcium and in whom urinary stasis does not exist. Albright and Flocks have observed that increased elimination ater through the kidneys is not accompanied by additional ut of calcium. The calcium concentration (and phosphorus may be satisfactorily diminished, therefore, by amplifying the r intake.

e three main types of primary metabolic stones are cystine, acid, and calcium.* In the presence of a foreign body or infec- involving ammoniacal fermentation, magnesium ammonium phate predominates. In none of these is the "ash" of the diet etermining factor. Attempts to impose a strict acidic-ash diet atients with a phosphate infection has too often resulted only aking the individual thoroughly miserable without demon- ly affecting the urinary pH. Except where it is possible to w the patient closely with biochemical supervision, prescription cidic- or alkaline-ash diets for nephrolithiasis should be dis- aged. Since the normal urinary tract is accustomed to being ed by a fluid of varying pH, adherence to any diet which will nish the variation would seem to be undesirable except in the nce of demonstrable need.

SUMMARY.

idity, when applied to food, is subject to some confusion. Since are two points of view (alimentary and urinary), the same food be classed as either alkaline or acid. Naturally, the food itself have but one reaction. With disintegration in the intestinal , some alteration occurs but the major change awaits those esses concerned with the building up and breaking down of body es. The end-products of the metabolism of any food which has been reduced to the status of a chemically pure compound de substances which are acidic, basic, and neutral. Predomi- e of one or the other results in classification of the food as alka- or acid as the case may be, this representing the anticipated

*The stones associated with hyperparathyroidism have been reported as consisting ium phosphate or carbonate. In this condition we have repeatedly encountered ture of phosphate and oxalate. It is the calcium which is significant.

effect on urine reaction. Neither digestion nor metabolism, ho ever, proceed at such a rate that there is any guarantee that t acids by one route and the bases by another will arrive at the kidne in time to exert the effect calculated from the composition of t food. It has been regarded as good nutritional form to "balanc the daily diet sheet in three or more meals. As long ago as 19 Sherman and Gettler demonstrated that such balancing could n be carried from one meal to another; that is, precisely the same foo gave different urine results when served in different combinations breakfast and lunch. Although Sherman in 1936 still question the merit of balancing acid-forming and base-forming foods, the le well-informed do not hesitate to prescribe diets of specific ash for multitude of ailments. Far too much emphasis has been placed o the character of the dietary residue with the result that more impo tant considerations have gone unnoted.

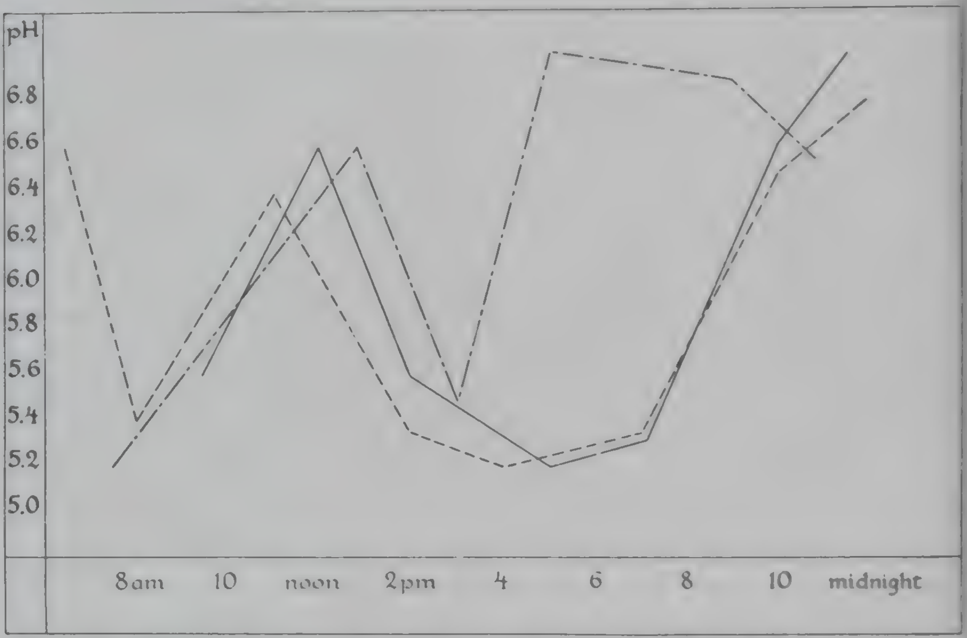


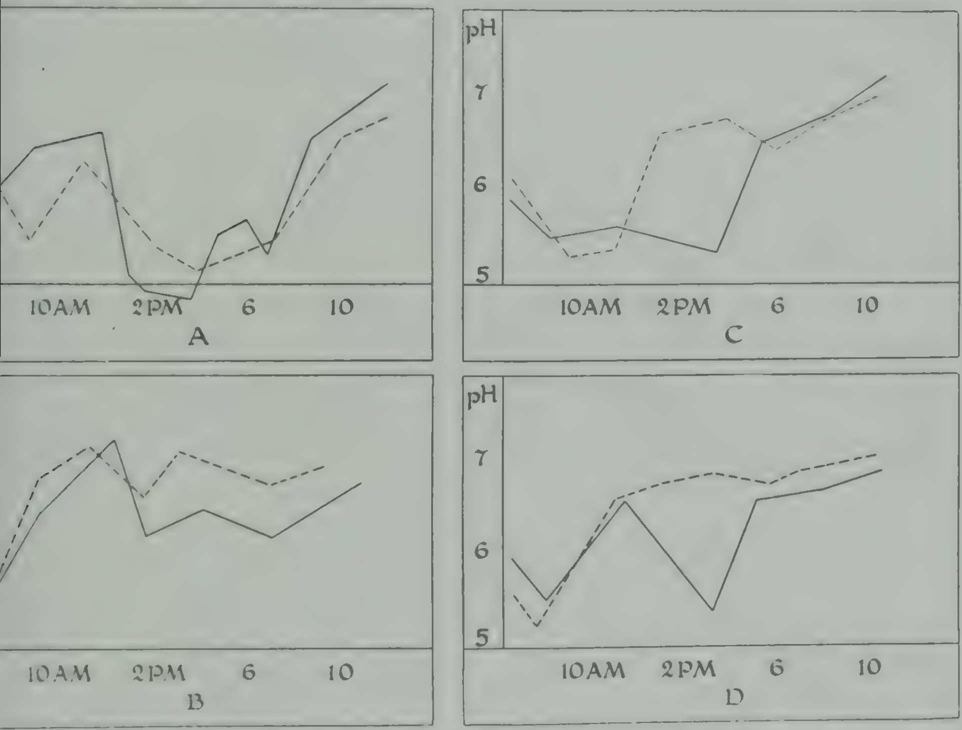
CHART 3.—Urinary pH changes after ingesting one cup of stewed rhubarb. ----- average "normal" curve; ——— after taking rhubarb at 10 A.M.; —·—·— afte taking rhubarb at 3 P.M.

It has been pointed out that urine reaction is the result of many factors simultaneously in operation. The kidneys respond to certai foods very quickly, yet it is not easy to determine the precise effec of food upon the reaction of the urine since it is not always the same According to the results presented in Chart 3 ingestion of rhubar in the morning has little influence on the urinary pH, but in th afternoon considerable effect. The difference is not in the rhubarb but in the variety of factors which determine the natural trend o subject's acid-base tide.

Chart 4 demonstrates the type of response to a strictly acidic-as lunch in which the only fluid permitted was 90 cc. of cranberry juice one of the most effective means of lowering urinary pH. The pur pose was to obtain an exaggerated response, if possible, by avoidin any upward trend attributable to output of fluid. For a simila

n ingestion of extra fluid was encouraged in the evening to sify alkalinization of the urine due to the character of the er. With 3 of the subjects sharp depression of the pH is seen e early afternoon, followed by prompt recovery. Subject B, ever, shows less acidity but prolongs the depression into the ing. There is no apparent effect of the alkaline-ash supper in subject.

strict diet, whatever its specification, usually is too much bother e adhered to for long. As a consequence, the "ash" diets have modified to such an extent that they have little claim to their ification. The Higgins' régime, for example, while described cidic or alkaline-ash is a well-rounded diet in which foods are ted to tip the balance either a little to the acid or alkaline side. ortunately, the data employed for figuring out the diet rest upon ire foundation.



rt 4.—Urinary pH changes with acidic-ash lunch followed by alkaline-ash dinner. ------ average "normal" curve; ——— response under test conditions.

or metabolic purposes the diet should be "balanced" with refer- e to protein, carbohydrate, fat, minerals, vitamins and water; e is no need for considering the ash left by such a diet. On the er hand, if it is desirable to alter the urine reaction, the procedure ar less simple. In the vast majority of cases where the urinary is seriously in error, means have yet to be devised for changing it. iberate alteration of urine reaction should not be sought as a l in itself. If abnormal fixation exists, there must be a reason upon this reason attention should be focussed rather than upon reaction *per se*.

SECTION VI.

PRACTICAL EVALUATION OF FOODS.

RUTH E. LLOYD, B.S., M.A.

Introduction.—There are various factors which influence the selection of food. Age, sex, climate, activity, race and religion as well as health and personality all contribute to the total picture.

It is interesting to note the importance of custom in an individual's food habits. Some are good habits with good reasons behind them. Studies which have been made show the remarkable persistence of the food preferences of earlier generations. Perhaps we should remember in considering a nutritional policy, to modify food customs only in so far as it is absolutely necessary to do so in order to provide the nutrients essential for health and efficiency. Also, if we are to achieve a steady progress we must not be swayed by passing fads and fancies.

Building good dietary habits then becomes a problem of continuous education. Individuals and groups must be awakened to a consciousness of the part that good nutrition plays in building and maintaining health.

CHEMICAL EVALUATION OF FOODS

Research has proven that it is impossible to calculate a diet on a strictly scientific basis because of the great variance in foods. Not only do foods vary in their content of nutrients but individuals also differ in their utilization of these foods. Factors as climate, soil, sunshine, degree of maturity, harvesting, handling, storage and the actual preparation of the food all affect the final values.

Charts of food values are compiled after careful study over a period of years. They represent the efforts of many investigators and the best average of numerous determinations.

This specific information is necessary to assist the doctor, nurse and dietitian in planning and checking the adequacy of diets.

The tables which show the composition of foods form the basis for all dietary calculations, but in their use there should be a recognition of their limitations.

Classification of Fruits and Vegetables.—For the systematic planning of any dietary, a classification of fruits and vegetables is necessary. Intelligent dietetic management requires the use of tables that will provide basic data and consist of representative average values. As the result of differences in the varied groupings of fruits and vegetables there is confusion in the selection of these values.

The degree of ripeness of fruits makes a difference in the sugar content since the riper they are, the more glucose there is contained in them. Also, fruits and vegetables which have been stored in warehouses and have dried out will test differently in any analysis.

ne use of standardized tables makes for simplification in diet ning and use by patients. We cannot hold to "pen point" racy since the utilization of a food will vary anyway with the vidual consuming it.

he clinician will find it helpful to use tables which do not confuse patient with a complication of figures. Consideration should ys be given to the importance of simple directions and often ting of fruits and vegetables as to groups will prove entirely quate.

he tables of proximate composition of fruits and vegetables as ed by the U. S. Dept. of Agriculture are widely used as a standard rence.

VEGETABLES

Group I.

3 per cent Carbohydrate.
2.0 per cent Protein.
0.3 per cent Fat.

aragus, fresh and
ned
bo shoots
ns, green and wax
greens
ccoli
bage
bage, chinese
liflower
ry
rd
ory leaves
umbers
k
ive
role
nel
Lettuce
Mustard green
Okra, canned
Poke shoots
Purslane
Radishes
Romaine
Sauerkraut, fresh and canned
Sea Kale
Sorrel
Spinach, fresh and canned
Squash, summer
Tomatoes, fresh and canned
Tomato juice, fresh and canned
Turnip tops
Watercress

Group II.

6 per cent Carbohydrate.
2.0 per cent Protein.
0.3 per cent Fat.

Beans, scarlet runner
Beans, snap
Chives
Collards
Dandelion greens
Eggplant
Kale
Kohlrabi
Lambs quarters
Leeks
Okra
Peppers, green and red
Pumpkin, fresh and canned
Squash, winter
Turnips

Group III.

r cent Carbohydrate.
5 per cent Protein.
0.3 per cent Fat.

tichokes, globe or rench
ets, fresh and nned
ssels sprouts
rrots
as, very young, esh and canned
tabagas

Group IV.

12 per cent Carbohydrate.

‡Beans, lima, canned

Group V.

15 per cent Carbohydrate.
2.5 per cent Protein.
0.3 per cent Fat.

Jerusalem artichoke, tuber
Parsnips
‡Peas, mature
Salsify
Vegetable oyster

Group VI.

18 per cent Carbohydrate.
2.5 per cent Protein.
0.3 per cent Fat.

‡Beans, baked
Corn
Potatoes, Irish

his vegetable contains a higher protein content than that listed for the group.
ood tables.

FRUITS

Group I.
3 per cent Carbohydrate.
0.7 per cent Protein.
0.3 per cent Fat.

Rhubarb, fresh and canned, w. p.
Strawberries, canned, w. p.

Group II.
6 per cent Carbohydrate.
0.7 per cent Protein.
0.3 per cent Fat.

Blackberries, canned w. p.
Blackberry juice
Gooseberries, canned, w. p.
Peaches, canned, w. p.
Plums, canned, w. p.
Strawberries
Strawberry juice
Watermelon

Group III.
9 per cent Carbohydrate.
0.7 per cent Protein.
0.3 per cent Fat.

Applesauce, canned, w. p.
Apricots, canned, w. p.
Blackberries
Cherries, red, white, canned, w. p.
Cranberries
Currants
Gooseberries
Grapefruit, fresh and canned, w. p.
Lemons
Lemon juice
Limes
Lime juice
Loganberries, canned, W. p.
Loganberry juice
Pears, canned, w. p.
Raspberries, canned, w. p.
Tangerines

Group IV.
12 per cent Carbohydrate.
0.7 per cent Protein.
0.3 per cent Fat.

Apple juice
Apricots
Cherries, sour
Grapes, canned, w. p.
Guavas
Mulberries
Oranges
Orange juice
Peaches
Pineapple, fresh, canned, w. p.
Plums
Raspberries

Group V.
15 per cent Carbohydrate.
0.7 per cent Protein.
0.3 per cent Fat.

Apples
Blueberries, fresh and canned, w. p.
Blueberry juice
Figs, canned, w. p.
Grapes
Nectarines
Pears

Group VI.
18 per cent Carbohydrate.
0.7 per cent Protein.
0.3 per cent Fat.

Cherries, sweet
Crab apples
Figs
Grapejuice, unsweetened
Persimmons, Japanese
Pomegranates

*Canned fruits included here are all water packed products. Other fruits listed are fresh.

Classification of Flesh Foods.—Meat ranks high in essential food nutrients and because of its aroma and flavor it has universal appetite appeal. The protein and fat content of meat varies with the cut and kind. The following general classification of muscle meats has been compiled from the figures of the U. S. Dept. of Agriculture Bulletin No. 572, 1945.

COMPOSITION OF MEATS

100 gram portions, raw	*Protein grams*	*Fat grams*	*Carbohydrate grams*	*Food energy calories*
Beef, lean	18.8	14.0		201
Ham smoked	16.9	35.0	0.3	384
Lamb, medium	18.0	17.5		230
Pork, lean	14.1	35.0		371
Veal, medium	19.1	12.0		184

Chatfield (1937) suggested a basis of comparison under two headings: relative fatness and relative dryness.

TABLE 15.—**Classification of Meats.**

	Fat, per cent.	Protein, per cent.
Lean meat:		
Dry (very well done)	6	34
Medium done	6	30
Moist (rare)	6	27
Medium fat:		
Dry	18	30
Medium done	18	27
Moist	18	23
Fat, medium done	30	22
Very fat, medium done	45	17

'he classification of fish is considerably more difficult because he rather wide variability in the fat content. Fish can be con-red an ideal source of proteins for convalescent diets. The teins of fish contain all the amino acids suitable for the nutrition nan. The food value is as follows:

Composition of Fish

00 gram portions, raw	*Protein grams*	*Fat grams*	*Carbohydrate grams*	*Food energy calories*
efish	20.5	4.0		118
	16.5	0.4		70
, miscellaneous, dium fat	19.0	2.5		98
dock	17.2	0.3		72
but	18.6	5.2		121

Effect of Cooking Upon Foods.—No matter how carefully cooking performed, a certain amount of loss of soluble constituents is ost unavoidable.

tudies are being conducted as to the extent to which cooking r alter the nutritive value of foods and more information on ual analyses of cooked foods will become increasingly available.

'ooking of vegetables leads to a reduction of carbohydrate by amount determined by the structure of the food, the method of king, the quantity of water used, the size of the pieces and the gth of time heat is applied. In general, there is a decrease of -third to one-half of the carbohydrate after cooking in water, portion lost being largely of utilizable nature. Ordinary ing of vegetables removes about 5 per cent of the proteins, le the loss of fats is relatively slight. The analyses of cooked uncooked foods will show marked differences when the water tent changes appreciably Cooking under steam pressure is reasing in popularity. By this method a maximum amount of or and vitamins and minerals is retained.

'he change in weight of meat during cooking is due chiefly to loss of water, although in the case of certain meats, as bacon, caused by the removal of fats. Even in par-boiling, the water tent diminishes. Boiling or steaming results in less removal vater due to volatilization; 3 to 20 per cent of the total solids be found in meat broth. The loss of water and minerals is

such that the percentage of salts remains the same in raw, boil[illegible] and steamed meat, but is higher in roasted meat. According t[illegible] British investigators, beef, when fully cooked, loses the same amoun[illegible] of weight, water and salts whether cooking is commenced in ho[illegible] or cold water. Experimental work has proven that boiling cause[illegible] meat to become stringy due to the fact that it dissolves rather tha[illegible] softens the connective tissue and that searing really increases th[illegible] cooking losses. Meat cooked by dry heat methods as roasting an[illegible] broiling shows a greater retention of B vitamins than meat cooke[illegible] in water. Ground beef free from visible fat shows changes in compo-sition as follows:

	Water, per cent.	Protein, per cent.	Fat, per cent.	Ash, per cent.
Uncooked	75.2	21.2	2.5	1.2
Pan-broiled	61.7	33.4	3.9	1.6

TABLE 16.—**Effect of Cooking Upon Composition of Meats.**

Food.	Mode of cooking.	Percentage loss of weight.	Percentage distribution of total loss. Protein.	Fat.	Salts.	Water
Bacon, very fat . .	Fried	61.7	0.4	52.5	1.2	45.9
Beef, 50-gram pieces .	Boiled 1 hour	43.0	4.8	6.1	2.0	87.1
Beef, 1600 grams .	Boiled	39.8	4.2	8.0	1.3	86.5
Beef, 1600 grams .	Roasted	39.2	2.0	10.0	0.5	87.5
Catfish	Steamed	33.4	3.1	0.3	1.0	95.6
Cod	Steamed	31.5	4.7	0.8	1.0	93.5
Mutton, lean . .	Boiled	42.0	4.4	3.1	1.2	91.3
Mutton, very fat .	Boiled	38.0	2.7	35.0	0.8	61.5

Pound for pound, overcooked meat contains more protein and probably more fat than undercooked. Investigation of nutritive values of canned meats and fish generally reveals a marked similarity to ordinary cooked foods.

If pan drippings are served with the meat or used in making gravies or soup, the protein, fat and salts and a large part of the vitamin content will be conserved. From the data shown in Table 17 it is apparent that "the amount of protein in the rib cut, greatly increased due to fat and water losses in cooking, becomes comparable with that of the lean, cooked top round ordinarily regarded as a more abundant source of protein."

TABLE 17.—**Effect of Roasting on Composition of Paired Cuts of Steer Beef.***

Cut.	Official U. S. grade.	Preparation.	Fat, per cent.	Protein, per cent.	Total solids, per cent.	Moisture, per cent.	Total ash, per cent.	Calcium, per cent.	Phosphorus, per cent.	Iron, per cent.
Clod	Good	Uncooked	18.2	21.1	41.2	58.8	0.964	0.012	0.156	[illegible]
		Roasted	22.0	25.3	52.8	47.2	1.060	0.006	0.211	[illegible]
Ribs	Good	Uncooked	31.0	19.8	51.8	48.3	0.812	0.009	0.136	[illegible]
		Roasted	32.6	31.9	64.9	35.1	1.065	0.008	0.199	[illegible]
Top round	Good	Uncooked	6.6	24.1	31.9	68.1	1.162	0.005	0.200	[illegible]
		Roasted	9.0	30.6	39.3	60.7	1.117	0.011	0.214	[illegible]

* Rogers, M., Gillum, I., Kunerth, B. L., and Pittman, M. S.: Jour. Am. Diet[illegible] Assn., **13**, 320, 1937.

me difficulty may be encountered in estimating the caloric e of meats, as most of the analyses reported in the table are n for raw meat. The mode of cooking and serving may reduce heat value by as much as 50 per cent. Sherman advocates iting the meat with the protein content shown by the average ll analyses and the caloric value indicated for the lean cuts.

rading of Foods.—Classification of food according to quality is ılarly practised by dealers without the consumer being conver- with the codes used. Price is not necessarily an index of qual- The vogue for *white eggs* in place of brown eggs is merely nmercial exploitation of the notion that the white eggs are erior particularly for invalids and children. The color of the l is of little significance since investigation has proved that there o chemical difference between the two. The New York public ers white eggs while the Boston consumer will use only the vn shelled egg.

here is a mistaken idea among the laity and among some of profession that the difference between *Grade A* and *Grade B* k depends upon the concentration of butter-fat. The legal iirements are such that both grades of milk have the same fat ent. Differentiation is based upon the bacterial count, high- lity milk having a low bacterial rating.

ı the canning of fruits, fancy grades consist of uniformly per- fruit in the best state of ripeness and of the largest size. The t is packed in a thick syrup. Cans of choice grade fruit contain rly perfect fruit of average size in a medium syrup. Standard le uses smaller, less uniform fruit in a medium syrup. Vegetables also graded as to fancy, choice and standard.

NUTRITIONAL EVALUATION OF FOODS.

nfortunately data furnished by chemical examination even of uot portions of the food ingested usually are not sufficient to rant conclusions regarding the physiologic fate of the various ıents. The chemical concentrations of foodstuffs do not ssarily represent the available chemical content.

tilization of Nitrogenous Compounds.—The standard method ascertaining the protein content of a food consists of conversion he nitrogenous compounds into ammonia. It is assumed that

$$\text{Food nitrogen} \times 6.25 = \text{protein.}$$

s may be erroneous: (1) Because the factor varies with the ein under analysis (for milk protein the proper factor is 6.37); because foods contain non-protein nitrogen for which no allow- e is made. The latter may consist of amino-acids and other vage products of proteins. With our present knowledge, it is ossible to determine whether the non-protein nitrogen is of no ritive value whatever, or is as good as the protein nitrogen. tions by Peters and Van Slyke show that 15 to 20 per cent he nitrogen of common foods exists in non-protein form; some

vegetables rate even higher. Ninety-four per cent of the total nitrogen of cow's milk is protein, for which the proper factor is 6.37.

Milk, meat, and eggs provide protein which has a coefficient of digestion of almost 98 per cent, that is, these proteins are in a form such that practically complete digestion is possible. Ninety-two to 95 per cent of the proteins of cheese are digestible when the concentrated character of this food is recognized and it is eaten with discretion.

Vegetables, on the whole, contain less available protein than other foods. Eighty per cent of the protein of fruits are digestible (the coefficient for fat is 97 per cent, for carbohydrate 95 per cent). The coefficient of digestibility for bread made from various flours is presented in Table 18.

Table 18.—**Comparative Utilization of Foodstuffs in Bread.**

Type of flour used in bread.	Coefficient of digestibility. Protein.	Carbohydrate.
White	88.6	97.7
Entire wheat	82.0	93.5
Graham	74.9	89.2
Whole rye	65.0	

Although toasting renders the carbohydrate of bread more digestible by conversion of a portion of the starch into dextrin, the protein becomes less soluble and presumably less readily attacked by the digestive juices.

Availability of Carbohydrates.—Carbohydrates most frequently are calculated "by difference" after direct determination of fats, proteins (N × 6.25), ash, water, and sometimes crude fiber. The combined errors of analysis thus fall upon the carbohydrate figure. Other methods of analysis employ direct hydrolysis with mineral acid or enzymes followed by copper reduction or polariscopic examination. Such figures more nearly approximate the utilizable carbohydrates in the food, but not all reducing sugars can be metabolized by the body. Many of the organic acids, as malic, tartaric, and citric, are classed as carbohydrates. These acids are oxidized to CO_2 and water, thus providing energy.

Raw starch is very slowly digested. Potato, arrowroot, tapioca and sago starches are not made more digestible by long cooking. Cereal starches, on the other hand, show increased digestibility after protracted cooking. Packaged cereals have usually been partially pressure-cooked by steam, hence the many hours of cooking once necessary are not required. It is best, however, to allow more time than the directions on the package indicate. Starch which is imprisoned within cellulose escapes digestion. Two foods of identical starch content may thus provide the body with widely varying amounts of sugar on digestion due to the presence or absence of plant fiber. Analyses of foods which include fiber under carbohydrate may be wholly misleading as to caloric value.

Raw foods which have enjoyed popular favor in faddist diets provide the body with less nutriment than when properly cooked.

e preparation of fruits and vegetables for ingestion in the raw te is necessarily more exacting, since the food will not be subted to sterilization by heat. Softening of fiber by cooking with nsequent reduction of intestinal irritation, together with the ther advantage of greater safety, may often outweigh any benefit be derived from vitamin or enzyme obtainable in raw foods. ce it has been demonstrated that laboratory animals thrive more ccessfully on cooked and canned products than on raw foods, it is re than reasonable to suppose that the same observation would d for human beings could adequately controlled experiments be dertaken.

McCance (1936) found nuts to contain from 1.7 per cent sucrose azils) to 7 per cent (chestnuts). Chestnuts, however, are unusual that they are rich in starch (30 per cent) and low in fat (may be s than 3 per cent). Complex carbohydrates, which are probably t utilizable, are present in most nuts.

Unassimilable carbohydrates included in the diet to give bulk d to promote regular peristalsis are, of course, without caloric ue. Agar-agar is hydrolyzed in the intestines only to a very ited extent. Precise knowledge regarding the fate of complex ysaccharides is lacking.

Sugars, especially lactose, are frequently prescribed for the terial flora or the colon rather than as fuel for the host. Where gar serves as substrate for bacterial action, fermentation occurs, e formation of such acids as acetic, lactic and butyric favoring mentary evacuation.

Availability of Calcium.—Calcium salts from different food rces are not equally well utilized. This may be due in part to ention in cellulose fiber, but it is primarily dependent upon the sence of oxalic acid. If a food contains enough oxalic acid to nbine with all of its calcium to form calcium oxalate, the indiion seems to be that the calcium is of little or no use to the body. ich plant calcium exists as the insoluble oxalate. Where the cium is bound to protein, as in milk, it is obviously more available absorption. Milk calcium is usually regarded as wholly assimile. Judging by biologic experiments, the calcium of kale is nost as available as that in milk; this is attributed to the low late content of kale. Spinach, on the other hand, is rich in lates. Investigations by Kohman (1939) indicate that spinach only supplies no available calcium but actually renders unassimble a considerable portion of calcium from other sources when ested with the spinach. Recognition of such factors is necessary the elaboration of a diet which will provide assimilable calcium. occoli and cauliflower also rank with milk. Experiments conted by Fincke (1941) find the calcium of cauliflower and broccoli king with kale in the availability of their calcium.

Experiments with adults on a balanced diet containing 1.5 gram calcium showed fecal excretion of *71 per cent* as contrasted with *per cent* when 15 grams of $NaHCO_3$ were added to the diet and *per cent* when 300 cc. of 0.1 N HCl were included; the total excre-

tion, however, was the same; merely the distribution between feces and urine was altered. Since diminished alkalinity of the absorbing area aids in the passage of calcium into the body, it is customary to employ varying amounts of HCl (as well as lactic acid or its precursor, lactose). For example, 50 to 100 cc. of N/3 HCl may be introduced into milk (1:20) before ingestion. Telfer (1939) investigating calcium metabolism in a child of six years concluded that HCl adversely affected the process of calcification. Greater absorption under acid conditions is apt to be associated with augmented urinary excretion and diminished retention of calcium.

Absorbability of calcium may be taken as a criterion of availability, yet this is not the whole story of calcium metabolism. The term, *utilization*, may be used to cover the broader field. In this sense, various foods and drugs (as calcium gluconate) may be studied by means of "balance" experiments for data as to relative increment of calcium retention compared to corresponding increment of intake.

Calcium balance studies which have been carried out with persons on high and low protein diets indicate that the diet high in protein resulted in an absorption of 15 per cent of the dietary calcium as compared to 5 per cent absorption on the low protein diet.

It is suggested by Sherman that at least two-thirds of the daily intake of calcium be derived from milk or cheese. As far as calcium and phosphorus are concerned, skim and whole milk are practically identical. When cheese is produced by acid coagulation, the larger part of the calcium remains in the whey, whereas coagulation of casein by rennin results in the precipitation of calcium in the curd. Cheddar cheese, therefore, contains approximately ten times as much calcium as does cottage cheese. Sherman emphasizes the fact that egg-yolk is almost ten times as rich in calcium as are meats and fish and two to five times as rich as breadstuffs. Unknown factors which occur in milk, eggs, and orange juice improve the retention of calcium particularly in growing children. Generous use of these items is therefore recommended.

Availability of Phosphorus.—Not all phosphorus compounds found in foods are equally utilizable. A variable amount (20 to 60 per cent) of ingested phytins (calcium-magnesium salts of inositolhexaphosphoric acid) are excreted unchanged. The fate of the remainder is obscure. On the average, 97.5 per cent of the phosphorus of animal origin is utilizable. Phosphorus is widely distributed in animal and plant foods so that the average diet undoubtedly contains an adequate amount. Where cereals bulk large in the dietary, the total phosphorus content is a wholly incorrect guide as to the available phosphorus intake. With the exception of cocoanut and chestnuts, nuts are rich in phosphorus, but as much as 86 per cent may be present as phytins and so of doubtful worth. The diet should be planned to contain sufficient phosphorus without dependence upon phytin-rich foods.

Availability of Iron.—Simple iron salts seem to provide the element in its most readily available form. Highly complex organic iron compounds, such as found in blood, are not utilized to any apprec-

extent. Since there are many organic and inorganic factors r than iron which influence hemoglobin production in anemia, natic generalizations about "food iron" are not safe (Whipple,). The availability of iron from foods has had far reaching stigation. This has resulted in the premise that foods vary sigantly in their available iron. Individuals will differ in their ity to utilize available iron and manufacture hemoglobin.

vailable or ionizable iron is determined with α-α'-dipyridyl since in the form of hematin-like compounds does not react with substance. Because of uncertainty attached to such findings, ogic experiments are generally employed also.

ose *et al.* (1935) found that the iron of egg-yolk and bran which been steamed and toasted were equally efficient in maintaining equilibrium in two human beings. The iron in spinach is largely ematin form. Harris, Mosher and Bunker (1939) found firstle molasses (which is a rich and inexpensive source of iron) to 97 per cent available by the chemical procedure and 90 per cent animal tests; second and third-grade molasses were 80 and 50 per t available in the biologic studies. Ascham *et al.* (1939) report the iron in the legumes is completely available for the regenern of hemoglobin in the nutritionally-anemic rat. Sherman sses that iron deficiency conditions may be due more to a diser in the body than to faulty nutrition. Also that recent experints show that, when the dietary is well balanced, the body has ore efficient economy of iron.

TRADITIONAL EVALUATION OF FOODS.

During the past 100 years the diets in this country have changed. a result of advances in nutrition, many of the practices of the t have been disproved. Greater emphasis is now placed on ts and vegetables and milk, whereas our forefathers consumed ater amounts of bread, meat and potato. Sherman advocates t 50 per cent of calories should be derived from fruits, vegetables, s, milk and milk products. The great strength-giving qualities *broth* have been mythical. It has been definitely proved that at extracts in the form of soups, whether made from chicken or f, whether prepared at home or bought as an extract, are relaely devoid of caloric value. As a food for weight reduction or the treatment of diabetes, they are universally recommended. o, as a stimulant of gastric secretion, particularly of hydrochloric d, they may be properly prescribed. For the debilitated and henic individual, the administration of broth may sufficiently mulate the gastric secretion to artificially produce an appetite a greater quantity of food than that which would normally be ested.

The *white meat of chicken*, as a food for the invalid, aside from its sible pleasing appearance, has acquired a successful competitor the dark meat from the same fowl. Frankly, the average palate more pleased by the eating of dark meat, particularly as it is

generally found to be more moist and seems to be slightly be[illegible] flavored.

Red meat, in contradistinction to well-done meat, has likew[illegible] been found to be without a nutritional difference.

The merits of *vegetable diets* have been widely extolled. In th[illegible] instances it is assumed that the normal protein requirement [illegible] supplied in the main by vegetables and nuts. Obviously, to obta[illegible] the requisite amount of protein from these items, a total vegeta[illegible] and nut ingestion beyond the capacity of a normal person is neces[illegible] tated. Vegetarianism, in spite of its widespread acclamation a[illegible] devoted followers, presents an inexplicable inconsistency. Its pri[illegible] ciples forbid animal protein, but milk, eggs, and cheese—all anim[illegible] products—are incorporated into the diets, at times most lavishl[illegible] In general most vegetable proteins have lower digestibility a[illegible] biological values than animal proteins. Recent studies have demo[illegible] strated, however, the completeness of some vegetable proteins i[illegible] the nutrition of rats and dogs.

Then there is *spinach*—once highly lauded, now partly in disgrac[illegible] It can no longer be regarded as a reliable source of calcium. Al[illegible] though it contains a fairly large proportion of calcium, it is in th[illegible] form of calcium oxalate which cannot be utilized. It can still hol[illegible] its own, however, for its laxative properties and its vitamin scor[illegible] is good (A, B, and C—if not lost in cooking). Nevertheless, it i[illegible] anticipated that less objectionable green vegetables will supersede spinach, especially for children.

Eggs are often thought to be indigestible if cooked hard. Experiments have shown, however, that it is the raw or lightly-cooked egg which may fail to be digested thoroughly. If the egg is cooked at the right temperature and chopped fine it will digest as quickly as the soft cooked one. The patient's preference, rather than the physician's, should be the guiding factor in the serving of eggs.

There has been much controversy over the inclusion of tea and coffee in the diet. Except in gastric cases, severe cardiac cases and other conditions where it is contraindicated by the physician, there is little evidence that the daily cup of coffee for breakfast has any adverse effect. This may mean the difference between enjoyment and non-enjoyment of a meal.

THE FEEDING OF CONVALESCENTS

The prominent role that food plays in the recovery of the patient is not questioned today. In the hospital we are aware that proper nutrition may diminish some of the effects of illness and certainly shorten the duration of convalescence.

Healthful, nourishing food is so very important to the person gaining a new foothold on the road to health. In planning this diet, the same fundamental principles upon which the normal diet is based will be used although taking into consideration that during illness, the digestive ability of an individual is always lowered. Consequently, there is the need for foods easily digested

readily absorbed. Present day methods call for modification e normal diet rather than the use of complicated and too rate special diets. This consistent effort to keep the diet as y normal as possible holds true whether in the hospital or for ry modifications necessary at home as in the case of the dia- person. Both from a psychological as well as from an eco- c standpoint it is bad for an individual to feel himself set from other members of the family.

k people are hard to please! It has often been said that it re difficult to please the palates of those who must patronize ospital than it is to satisfy the appetites of those who are on ation jaunt. A great deal of ingenuity is imperative in plan- aried and interesting menus and the dietitian will need to use the resources at her command.

e appetite is largely affected by the state of mind, and psycho- factors are of the greatest importance. Individualization nes the keynote in the successful feeding of people. We ot always hope to reach the ideal, but at least we can attempt attainment.

e completed meal should be visualized and an effort made to onize food colorings as well as to balance food constituents. t often sells food to the patient or even to the members of the y at the table is the way it is served and the way it is seasoned. foods should be served hot and cold foods cold.

e eat with our eyes. Best food tastes better if served in a dress manner, although on the other hand food may become tractive when too fancy. Simple garnishes, however, add a f glamour.

tention to detail is paramount in the preparation of meals he sick or convalescent. Patients should be presented with s which stimulate a desire to eat. They should look forward eir meals with anticipation and back upon them with satis- on.

less a patient can be persuaded to eat, little good will be nplished in spite of the fact that the dietary is properly planned, ared and served.

SECTION VII

TABULATION OF FOOD FACTORS.

In the course of the dietetic management of patients, it is frequently necessary to reduce or increase a specific element. For the convenience of the clinician tabulation of high and low concentrations of the various food factors has been provided in the form of ready reference lists. This material is handicapped by lack of data to make the lists scientifically inclusive or exclusive. Where a desired food is not listed, the tables in the Appendix should be consulted to learn whether analytical data are available on the particular food or the item has been omitted because its composition is average rather than high or low. In every instance the clinician should be guided by the size of the portion served as well as by the percentage composition of the food.

The following lists are arranged in two alphabetical groups, first **high concentrations** of the various food elements, then **low concentrations**. The listing concludes with miscellaneous items.

HIGH-CONCENTRATION FOODS.

Foods Highest in Calcium.

- Almonds
- Beans, dried, shelled
- Cabbage, outer green leaves
- Collards
- Dandelion greens
- Canned salmon bones
- Cheese, rennet
- Clams
- Ice-cream
- Kale
- Maple syrup
- Milk, malted milk, whole or skimmed, buttermilk, evaporated, condensed, dried
- Egg-yolk
- Figs, dried
- Hazel nuts
- Molasses
- Mustard greens
- Soybeans
- Turnip greens
- Watercress

Foods Moderately High in Carbohydrates.

Foods Containing 20 to 50 Per Cent Carbohydrates.

- Apple butter
- Bananas
- Cashew nuts
- Catsup
- Chestnuts
- Chili sauce
- Chocolate, sweetened unsweetened
- Cocoanut, fresh
- Corn, cooked
- Dumpling
- Fruits, canned, choice or standard
- Griddle cakes
- Ice-cream
- Legumes (dried), cooked
- Macaroni, boiled
- Peanut butter
- Peanuts
- Pickles, sweet
- Pies and tarts
- Puddings, as plum, rice, tapioca
- Potatoes, cooked, sweet and white
- Prune juice
- Rice, boiled
- Water-ices

Foods Highest in Carbohydrates.

Foods Containing More Than 50 Per Cent Carbohydrates.

uits and crackers
ad and rolls
es
died fruits
dy
eals
densed milk
Doughnuts
Fruits, canned, fancy
Fruits, dried
Honey
Jams and jellies
Litchi "nuts"
Coconut, dried
Marmalades
Marshmallow
Milk chocolate
Molasses
Popcorn
Sugars and syrups
Zwieback

Foods Highest in Cellulose (Roughage).

les (whole)
aragus
anas.
ns
ts
ries
n products
bage
rots
uliflower
ery
n
es
plant
s
Grapes
Horseradish
Kohlrabi
Leafy vegetables
Lentils
Melons
Mushrooms
Nuts
Okra
Onions
Parsnips
Peaches (whole)
Pears (whole)
Peas
Peppers, green
Plums
Pomegranates
Prunes
Pumpkin
Radishes
Raisins
Rhubarb
Salsify
Spinach
Squash
Sweet potatoes
Turnips
Whole grain cereal products
Yams

Foods Highest in Chlorides.

(All Brined, Corned, Pickled, Smoked and Salted Foods.)

con
ads
nned meats and
ish
eese, cheddar
Corned beef
Dates
Eggs
Fish and meat pastes
Milk
Meat juice
Molasses
Olives
Sausages
Soup cubes

Foods Highest in Cholesterol.

ains*
r-yolk*
h roe*
lney*
Liver*
Sweetbreads*
Butter
Fish
Lard
Meats and poultry
Oysters
Suet

Foods Highest in Copper.

coa powder
rn
gumes
er
Molasses
Nuts
Oatmeal
Oysters
Wheat bran
Whole grains

* Outstanding.

Foods Highest in Fats.

Foods Containing More Than 20 Per Cent Fat.

Avocado	Egg-yolk	Oils, except mine[ral]
Bacon	Fatty meats	Pastry
Bone-marrow	Fried foods	Potato chips
Butter	Goose	Salad dressings
Catfish	Lard	Sardines in oil
Caviar	Margarine	Sausage
Cheese, whole milk	Meats, except very lean	Suet
Chocolate	Nut butters or pastes	Turkey
Cream	Nuts, except chestnuts	Whole milk powder
Duck		

Foods Highest in Iodine.

Agar-agar	Irish moss	Oysters
Clams	Leafy vegetables	Salmon
Crabmeat	Lobster	Salt-water fish
Eggs	Mushrooms	Shell-fish liquor
Fish-liver oils	Mussels	Watercress
Fish roe		

Foods Highest in Available Iron.

Almonds	Lentils, dried	Peas
Apricots, dried	Liver	Peas, dried
Beans, dried, shelled	Molasses	Prunes
Chard	Oatmeal	Raisins
Eggs	Oysters	Rye flour
Figs, dried	Parsley	Sausage
Heart	Peaches, dried	Wheat, whole, shredded, bran
Kidney	Peanuts	

Foods Highest in Magnesium.

Beans, dried	Molasses
Beet greens	Nuts
Cereals, except polished rice	Oatmeal
Cocoa	Paprika
Corn	Pepper
Dried fruits	Wheat bran
Legumes, dried	Wheat-germ

Foods Highest in Manganese.

Cocoa, dry	Nuts	Turnip and beet tops
Legumes	Pineapple, fresh	Whole grain cereals
Leafy vegetables		

Foods Highest in Niacin (Nicotinic Acid) A

en*
, leafy vegetables
ock
ey beans
meats
*

Milk, butter-milk, evaporated, dried, skimmed, whole
Peas, green, dried
Peanuts
Peanut butter
Pork, lean

Salmon
Soy beans
Tomato juice
Tomatoes
Turnip greens
Wheat-germ
Yeast*

Foods Highest in Oxalic Acid.

(In Order of Decreasing Percentage.)

y seeds
bsquarters
greens
ane

Spinach
Swiss chard
Rhubarb
Cocoa

Poke
Pepper, ground
Sorrel
Parsley

Foods Highest in Phosphorus.

, liver, etc.
se
plate
a

Egg-yolk
Legumes
Meats, poultry, fish
Milk, dried

Nuts
Wheat-germ
Whole grain cereals
Yeast, dried

Foods Highest in Potassium.

nas
s, dried
s
coli
olate
ls
age greens
ar
als
a
lelion greens
l fruits

Endive
Guavas
Horseradish
Kohlrabi
Legumes
Lettuce
Limes
Meat extracts
Meats and fish
Melons
Molasses
Mushrooms
Mustard

Nuts
Olives
Paprika
Parsnips
Pepper, black
Potatoes, white and sweet
Pumpkins
Rutabagas
Spinach
Turnips

Foods Highest in Proteins.

onds
ernuts
ew nuts
se
taceans

Fish roe
Game
Gelatin, dry
Gluten products
Legumes, dried
Meats, lean
Milk powder
Oatmeal

Peanuts
Pistachio nuts
Poultry
Protein milk
Soy-bean products
Walnuts, black
Wheat cereals

Foods Highest in Purins.

Meat extracts, broths, gravies*	Game birds	Salmon, canned
Sweetbreads*	Herring	Sardines, canned
Herring roe*	Mussels	Scallops
Cod roe	Organs (heart, kidneys, liver)	Smelts

Foods Moderately High in Purins.

Legumes	Muscle tissues of meat, fish, poultry	Yeast
Mushrooms		
Spinach		

Foods Highest in Sodium.

Biscuits	Dandelion	Paprika
Bread	Crackers	Pepper, black
Butter	Egg-white	Raisins
Caviar	Lima beans, dried	Spinach
Celery	Meat extract	Turkey
Cheese	Olives	Wheat, entire
Clams	Oysters	

All brined, corned, pickled, smoked and salted foods.

Foods Highest in Sulfur.

Bacon	Clams	Meats
Beans, dried	Cocoa	Mustard, dry
Bran	Crackers	Nuts
Brussels sprouts	Eggs	Onions
Cabbage greens	Fish	Oysters
Cauliflower	Fowl	Peas, dried
Cereals	Horseradish	Swiss chard
Cheese	Macaroni	Watercress

Foods Highest in Vitamin A.

Apricots	Fish liver oils*	Parsley
Beet greens	Fish roe	Papayas
Butter	Green vegetables	Peaches, yellow
Carrots	Kale*	Spinach
Cheese, cheddar type	Liver	Turnip greens*
Cream	Milk, fresh, dried, evaporated	Watercress
Egg-yolk	Mangoes	Yellow vegetables
Escarole*		

* Outstanding.

Foods Highest Vitamin B_1 or Thiamin

ator pear	Egg-yolk	Rice, brown,
s, fresh,	Leafy vegetables	converted
lled, soybeans	Legumes	Tomatoes
d, whole wheat	Nuts	Turnip greens
age, raw	Okra	Wheat bran
ots	Organ meats	Wheat-germ*
, cornmeal	Peppers	Whole cereal grains
l brewer's yeast*	Pork	

Foods Highest in Vitamin B_2 or Riboflavin.

cots	Dried yeast*	Milk
ados	Eggs	Peanuts
greens	Figs, dried	Prunes
coli	Leafy vegetables	Soy beans
iflower	Lean meat	Turnip greens
se	Liver*	Wheat-germ
berries		

Foods Highest in Biotin.

yolk	Liver	Molasses
ey	Milk	Yeast

Foods Highest in Choline.

als		Meat
s		Vegetables

Foods Highest in Folic Acid.

r		Spinach
cle meats		Tomatoes

Foods Highest in Pantothenic Acid.

ey		Whole grain cereals
r		Yeast

Foods Highest in Vitamin B_6 (Provisional).

oil*	Olive oil*	Cereals, whole grain
onseed oil*	Peanut oil*	Legumes, especially
*	Rice oil*	soy beans
eed oil*	Wheat-germ oil*	Seeds

Foods Highest in Vitamin C or Ascorbic Acid.

age, new, raw*	Pimentos*	Broccoli
tard greens*	Watercress*	Sprouted grains
ley*	Cantaloupe	Strawberries, fresh
ika*	Citrus fruits	Kale
ers*	Papaya	Tomatoes

* Outstanding.

Foods Highest in Vitamin D.

Fish-liver oils*	Clams	Herring
Foods enriched with vitamin D	Cream	Oysters
Burbot, ling (European)	Egg-yolk	Salmon
Butter (variable)	Haddock	Sardines
	Halibut	

Foods Highest in Vitamin E.

Wheat-germ*	Leafy vegetables	Peanuts
Butter (pasture-fed cows)	Legumes	Vegetable oils (corn, olive, palm, cotton seed)
Cereal seeds	Meat	Whole grain cereals
Eggs	Milk	
	Molasses	

Foods Highest in Vitamin K.

Alfalfa leaf meal*†	Green leaves:	Pig-liver fat
Egg-yolk	Carrot tops	Soy-bean oil
Cabbage	Kale	Tomatoes
Cauliflower	Spinach	Sea weed

Foods Highest in Water.

Foods Containing Over 70 Per Cent Water.

Asparagus	Eggs	Shell-fish
Beef juice	Fruit juices	Soups
Berries	Fruits, fresh	Stews
Beverages	Gruels	Vegetable juices
Buttermilk	Leafy vegetables	Vegetables, fresh, canned
Calf's foot jelly	Milk	
Cream, 20 per cent	Sauerkraut	

LOW-CONCENTRATION FOODS.

Foods Lowest in Calcium.

Alimentary pastes	Crabs	Onions
Asparagus	Crackers and biscuits	Orchard fruits
Bacon	Egg-white	Peppers, green
Bananas	Eggplant	Pineapple
Beef juice	Fish	Potatoes, white and sweet
Beets	Flour	Scallops
Berries	Fruit juices	Soft water
Bread, white, rye	Honey	Squash
Brussels sprouts	Jelly	Sugar
Butter	Lettuce, headed	Tapioca
Citrus fruits	Lobster	Tea
Coffee	Mayonnaise	Tomatoes
Cooked cereals	Meats	Vinegar
Corn, green	Melons	
Corn syrup	Mushrooms	

* Outstanding.

† Used in reinforced cereals and infants' foods.

Foods Lowest in Carbohydrates

Foods Containing 0.5 to 3 Per Cent Carbohydrates.

paragus, cooked	Crabs	Pickles, dill
ussels sprouts, cooked	Cream, 40 per cent	Poultry
bbage, boiled	Cucumbers	Romaine
uliflower, cooked	Escarole	Sauerkraut juice
lery, cooked	Fish	Shad roe
lery cabbage	Kohlrabi, cooked	Shrimp
ard, cooked	Lemon juice	Soy-bean milk
eese, cheddar type	Lettuce	Spinach, cooked
icory	Lobster	Swiss cheese
ams, soft-shell	Meats, except very fat	Turnip tops, cooked
	Okra, cooked	

Foods Negligible in Carbohydrates.

con	Pickles, sour
ne-marrow	Philadelphia cream cheese
uillon	Roquette
tter	Salad dressing, French
nsommé	Sea-kale
gs	Sorrel
latin, dry	Soy-bean meal
llandaise sauce	Specific dietetic foods
ish moss	Truffles
rd	Vegetable marrow, cooked
argarine	Vegetables, 3 per cent, boiled in much water
eat juice	Vinegar
ushrooms	Whitefish, steamed
ls	

Foods Lowest in Cellulose. (Roughage)

imentary pastes	Fish	Molasses
rowroot flour products	Fruit juices	Mollusks
eef juice	Gelatin	Oils
utter	Gruels	Puréed foods
akes, crackers, biscuits (refined flour)	Honey	Sago
ereals, refined	Ice-cream, plain	Soups, strained
heese	Jellies	Starches
hicken	Mayonnaise	Sugars
ream	Meats	Vegetable juices
ggs	Milk	White bread
		White potatoes

Foods Lowest in Chlorides.

Apple butter
Barley, pearled
Berries
Buckwheat
Cabbage
Chestnuts
Citrus fruits, except limes
Corn
Cucumbers, fresh
Currants, fresh
Figs, fresh
Fruit juices
Grapes
Honey
Jellies
Lima beans
Maple syrup
Mushrooms
Mustard, dry
Onions
Orchard fruits
Parsnips
Peas, fresh
Peppers, green
Pomegranates
String beans
Tapioca
Watermelon

Foods Lowest (Negligible) in Cholesterol.

Breadstuffs
Egg-white
Cereals
Fruits
Nuts
Sugars and syrups
Vegetables
Vegetable oils

Foods Lowest (Negligible) in Fats.

Bouillon
Cabbage
Candy
Celery
Cheese, skim milk
Citrus fruits
Cod
Consommé
Cornstarch
Cranberry sauce
Cucumber
Currants, fresh
Egg-white
Figs
Fruit juices
Gelatin, dry
Greens, cooked
Haddock
Hominy
Honey
Jams
Jellies
Lichi nuts
Marmalade, orange
Marshmallow
Meat juice
Melons
Molasses
Mushrooms
Okra
Orchard fruits
Peppers, green
Pickles
Pineapple
Radishes
Rhubarb
Rice
Root vegetables
Salad greens, except cress and dandelion
Sauerkraut
Squash
String beans
Sugars
Syrups
Tapioca
Tomatoes
Vinegar

Foods Lowest in Magnesium.

Dairy products
Fruit juices
Fruits
Refined cereals
Root vegetables
Salad vegetables

Foods Lowest in Nicotinic Acid.

Cereals
Fats
Fruits
Root vegetables
Sugars
Syrups
Butter
Gelatin
Oils

Foods Lowest in Oxalic Acid.

imal foods
pples
ocados
ntaloupe
uliflower
herries, sweet
ess
Cucumbers
Grapes
Peaches
Grapefruit
Lemon juice
Lime juice
Melons
Mustard greens
Nectarines
Peas
Plums
Radishes
Squash, summer
Turnips

Foods Lowest in Phosphorus.

sparagus
eet greens
eets
utter
abbage
arrots
orn syrup
ucumber
ggplant
gg-white
Escarole
Fruit juices
Fruits
Honey
Jelly
Maple syrup
Mayonnaise
Molasses
Olives
Peppers, green
Pumpkin
Radishes
Refined cereals
Rhubarb
Squash
Tapioca
Tomatoes
Whey

Foods Lowest in Potassium.

pples
sparagus
acon
erries
read, rye, white
utter
uttermilk
heese
itrus fruits
lams
orn, green
Crackers
Cream
Cucumbers
Eggplant
Eggs
Farina
Fruit juices (except pine-apple and tomato)
Grapes
Hominy
Macaroni
Milk
Okra
Onions
Oysters
Pears
Peppers, green
Pork
Rice, white
Soup
Squash, summer
Watermelon

Foods Lowest in Proteins.

rrowroot flour
eans, string
eef-marrow
utter
abbage family vegetables
arrots
assava
atsup
ocoanut milk
ggplant
Fruits and juices
Honey and syrups
Jellies
Marmalade
Mayonnaise
Molasses
Oils
Okra
Olives
Pickles
Potato flour
Potatoes, white and sweet
Refined carbohydrates
Rhubarb
Salad dressing, French
Salad vegetables
Squash
Tapioca
Tomatoes
Turnips
Vegetable juices

Foods Practically Purin-free.

Cheese	Most vegetables except spinach, mushrooms, lentils, asparagus	Processed cereals
Cream		Gelatin
Eggs, fresh		Milk
Fruits		

Foods Low in Purins.

Boiled meats, separated from fluid	Onions
Celery	String beans

Foods Lowest in Sodium.

Cereals	Honey	Parsnips
Chocolate	Kidney beans	Potatoes
Cream	Lettuce	Rice
Flour	Macaroni	Squash
Fruit juices	Maple syrup	Tomatoes
Fruits	Molasses	Wheat gluten

Foods Lowest in Sulfur.

Butter	Salad vegetables, except ca bage, onions and watercre
Fruit and vegetable juices	Starches, as arrowroot, sago
Fruits	Sugars and syrups
Rhubarb	
Root vegetables, except rutabagas	

Foods Lowest in Vitamin A.

Bacon	Cucumbers	Molasses
Beets	Eggplant	Onions
Bread	Egg-white	Pears
Cabbage, white	Figs	Potatoes
Celery, blanched	Flour, white	Radishes
Cereals	Grapefruit	Raisins
Cocoa butter	Grapes	Rice
Concentrated carbohydrates (honey, starches, etc.)	Lard	Turnips
	Lean fish and meats	Vegetable fats and oi
	Lemons	Watermelon
Cranberries	Milk, skim	

Foods Lowest in Vitamin B_1 or Thiamin.

Apples	Fish	Peaches
Beef juice	Honey	Pears
Berries	Kohlrabi	Peppers
Butter	Lard	Plums
Celery	Limes	Polished rice
Cheese	Milk	Rhubarb
Cranberries	Molasses	Sauerkraut
Cucumbers	Oils	Starches
Eggplant	Onions	Sugars
Egg-white	Patent flour	Turnip
Fats		

Foods Lowest in Vitamin B_2 or Riboflavin.

ples
rley
ef juice
rn
anberries
cumbers
tes
gplant
ts

Flour
Grapefruit
Grapes
Honey
Lemons
Oatmeal
Oils
Olives
Onions

Oranges
Pineapple
Radishes
Rice
Rye
Tomatoes
Turnips
Wheat, whole

Foods Lowest in Vitamin B_6 Pyridoxine (Provisional).

g-white
eats

Fruits
Milk

Vegetables
Egg

Foods Lowest in Vitamin C or Ascorbic Acid.

ples
ricots
ead
tter
rrots
reals
eese

Dried and stored fruits
Dried vegetables
Eggs
Fats and oils
Fish
Grapes

Meats
Milk
Nuts
Olives
Pears
Plums
Squash

Foods Lowest in Vitamin D.

reals
rn oil
ttonseed oil
uits

Lard
Milk
Nuts
Olive oil

Peanut oil
Starches
Sugars
Vegetables.

Foods Lowest in Vitamin E.

tter (dry-fed cows)
coa butter
d-liver oil
rd

Milk powder stored with oxygen
Refined corn oil
Sesame oil

Foods Lowest in Water.

Foods Containing Less Than 30 Per Cent Water.

tter
kes, crackers
ndy
ereals, ready-to-eat
coanut
rackers, biscuits

Dried fruits
Nuts
Jellies
Molasses
Popcorn
Potato chips

Pretzels
Smoked baco
Suet
Syrups
Zwieback

MISCELLANEOUS.

Foods Most Effective in Increasing Hemoglobin.

Apples	Brains	Pig kidney
Apricots	Calves' liver	Pineapple
Beef heart	Chicken gizzard	Prunes
Beef kidney	Chicken liver	Raisins
Beef liver	Lamb kidney	Strawberries
Beef spleen	Lamb liver	Whole grain cereals
Bone-marrow	Peaches	

Each of the following foods contains a high amount of iro manganese and copper. They may be additionally infiltrated in any diet where increased hemoglobin is desired.

Almonds	Cocoa	Pineapple
Beans, kidney	Filberts	Pistachio nuts
Beans, lima	Lentils	Spinach
Beef juice	Liver, calves'	Walnuts
Cherries, fresh	Olives, green	Watercress
Chocolate	Parsley	Wheat bran

Flatulence-producing Foods.

Beverages.

Carbonated waters, soft and highly sweetened drinks, malt beverages and sparkling wines.

Cheese.

Highly fermented cheeses.

Desserts.

Sweet foods, such as candy, maple sugar, honey, clear sugar, jam, etc.

Fruits.

Apples, raw	Raisins
Cantaloupe	Watermelon

Soups.

Meat broths, especially stock soups containing any of the following vegetables.

Vegetables.

Beans, dry	Cucumbers	Peas, dried
Broccoli	Garlic	Peppers, green, red
Brussels sprouts	Lentils	Radishes
Cabbage	Lettuce	Swiss chard
Cauliflower	Onions	Turnips

Other Substances.

Condiments, extremely hot or cold foods, nuts, excessively salted foods, spices, some uncooked foods and cold fried foods.

Fluid Foods.

rages.
Alcoholic, carbonated, coffee, coffee substitutes as Postum, tea.
als.
Strained with milk or water, as gruels.
serts.
Thin boiled custard, junket, plain ice-cream, gelatin, fruit ices and sherbets.
s.
In albumenized drinks, eggnogs, fruit juices.
its.
Strained juices.
k and Cream.
Malted milk, cocoa, buttermilk, fermented milks, whey, goat's milk.
ps.
Clear broth, strained vegetable and cream of vegetable.
etables.
Strained juices.

Soft Foods.

erages.
According to individual indication.
adstuffs.
Any bread, crackers or rolls made from white flour. Zwieback.
ter, Milk, Cream.
eals.
Finely ground, well cooked. Also, see vegetables.
ese.
Cottage, Philadelphia cream.
serts.
Plain puddings such as cornstarch, rice, tapioca, sago; ice-cream; plain cake and cookies; custards, gelatin, and junket.
s.
Baked, poached, soft-cooked or scrambled in double boiler; eggnogs, etc.
its.
Strained fruit juices, ripe bananas, fruit purées, cooked fruit without skin or seeds.
t and Fish.
Minced beef and lamb; chicken and fish, boiled, broiled, roasted or creamed; crisp bacon.
ps.
Clear broth, hot or jellied; strained vegetable and cream of vegetable.

Vegetables. Puréed; potatoes, baked, boiled or mashed; potato s stitutes, boiled, buttered, or creamed; macaroni, nood spaghetti, vermicelli, rice.

Miscellaneous.

Sugar and salt in moderation; jellies and jams without skin seeds.

NOTE.—In preparing a soft diet any fluid food may be added the foregoing list.

Bland Foods.

(Antacid, Roughage-poor.)

Beverages.

Cocoa, cream, eggnog, milk, fermented milks, malted milks

Breadstuffs.

Any bread, crackers or rolls made from white flour. Zwieba

Cereals.

Strained Cream of Wheat, farina, oatmeal, arrowroot gru Wheatena or other cooked cereal. Macaroni, noodles, sp ghetti.

Cheese.

Cottage cheese, cream cheese, pot cheese.

Desserts.

Blanc-mange, custard, frozen custard, junket. Soft milk-an egg cereal puddings, such as cornstarch, rice, tapioca an arrowroot. Ice-cream, other than coffee or fruit flavor, an mousse.

Eggs.

Baked, poached, soft-cooked or scrambled in double-boil with milk or cream. Also in custard, eggnog, etc.

Meat and Fish.

Meats such as chicken, fish (boiled, broiled or baked).

Soups.

Cream soups, made with cream or milk and flour, flavore with any of the allowed vegetables.

Vegetables. Purée of asparagus, carrot, beet, spinach, squash, strin bean and green pea. Potatoes, white, mashed, riced boiled. Rice (boiled or steamed).

Miscellaneous.

Butter and olive oil.

NOTE.—These foods are indicated in hyperchlorhydria of extr gastric etiology in which there is no fat intolerance. They are al suitable for convalescent duodenal ulcer and mucous colitis wi associated hyperchlorhydria.

Foods With Negligible Caloric Value.

Agar-agar.

Beverages

Bouillon, clear coffee, clear tea, clear Postum, Sanka, Kaff Hag, cracked cocoa, mineral waters, broth (skimmed), alk line waters.

ls.

Starch-free bran cereal. (Prepared cereals without food value may be purchased.)

ral Oil.

As a substitute for olive oil in salad dressings; as a lubricant in pan-broiling and frying.

s.

Paprika, mustard, garlic, pepper, salt, vinegar. (Prepared condiments such as chili sauce, piccalilli, catsup usually contain ingredients that have considerable food value.)

h-free Bran Biscuits and Starch-free Bran Bread.

SECTION VIII.

FOOD ADJUNCTS.

Alcohol, Tea, Coffee, Condiments, Spices and Tobacco

Introduction.—In the complexity of the present-day dietar much stress is being placed on the vitamins, roughage and weight that the factor of palatability has been somewhat ecli The art of preparing and serving meals is still as important as i days when eating was the outstanding dissipation. Then, as the secret of success was the judicious use of those food adju which change the act of eating from one of mechanical refuelin the truly delightful and enjoyable experience of dining. Bec of the combined psychic and mechanical stimulation to app excited by these adjuncts, the flow of gastric juice can be chan from a mere trickle to a virtual flood, and the attitude of the stom changed from that of mere passive acceptance to a truly enthusia reception of the oncoming meal. These adjuncts to be sure do supply any appreciable amount of the essentials which we requir maintain normal tissue metabolism; but they do serve the m noble, if not so necessary, purpose of making those essentials fo in the regular run of foods, appear as luxuries and the partaking them pleasing as well as satisfying.

Alcohol (Ethyl).—Ethyl alcohol is formed by fermentation, s thesis and by natural body processes. In this discussion, that rived from fermentation alone will be considered. Ethyl alco has a fuel value of 7 Calories per gram, which is approximately m way between those of carbohydrate and fat. It is 98 per c completely oxidized in the body.

Tables 19 and 83 on pages 189 and 853 indicate the range alcoholic content of the more common beverages.

The first noted effect of alcoholic beverages on the gastro-int tinal system is found in the mouth where there is an increased cretion of saliva. The constituents of the saliva are unaltered; th is merely a quantitative increase. This is the result of the ref stimulation of the odor and taste of the beverage. Associated w this, there is a stimulation of the gastric secretion, as well as of gast peristalsis. The digestive ferments are unaltered except in volu On ingestion of larger amounts of alcohol, that is, 100 cc. or m of brandy there is noted a profuse secretion of mucus in the stoma indicating probable deleterious effect. When combined with la amounts of sugar, alcohol is much more irritating to the muc membranes of the stomach and absorption is markedly accelerat under these conditions. Approximately 20 per cent of the alco is absorbed from the stomach. Habitual users of alcohol develo slower rate of absorption. Subjectively, alcohol appears to act a diuretic. This is the result of the very rapid absorption of fl from the gastro-intestinal tract with its consequent eliminati There has been no true diuretic action of alcohol demonstrated.

TABLE 19.—Alcoholic Content of Some Common Beverages.

	Alcohol by weight Per cent.
ts—by fermentation of saccharine substances as corn, e, barley, molasses, potatoes, grapes, etc. Whiskey, brandy, rum, gin	35–45
Liquors—by fermentation of malt and hops Beer, stout, ale, porter	3–7
s—by fermentation of grape juice Strong dry wines—Port, Sherry, Madeira	15–20
Strong stout wines—Tokay, Malaga, Sweet Champagne	8–12
Aromatic Wines—Moselle, Capri, some Rhine wines	7–12
Sparkling Wines—Dry Champagne, Sparkling Burgundy	9–13
Perfect Wines—Sauterne, Bordeaux	8–15
Rough Wines—high tannic-acid content derived chiefly from the grape skin, Claret, Burgundy	6–10
ueurs and Bitters—fruits of aromatic herbs, steeped in ctified alcohol and water Chartreuse, Benedictine, Curaçao, Absinthe, Angostura	18–50
er—fermented juice of ripe apples	3–6

cohol acts as a narcotic and depresses the central nervous m, more especially the higher centers, thus releasing the lower s from the cerebral restraint, producing increased freedom of ch and action and greater self-confidence with a sense of well-g. Sensory perception is dulled and muscular incoördination ts.

bsorption of alcohol brings about a dilatation of the peripheral d-vessels and probably of the deeper vessels, resulting in a sensa- of warmth. Actually an increase in peripheral temperature of 1° to 2.5° F. as measured at the tip of the third finger can be ght about by the ingestion of 2 ounces of brandy. This effect ident within fifteen minutes of ingestion. There is usually a t fall in blood-pressure, the pulse is accelerated, and premature ractions are occasionally associated with overindulgence.

is recognized that alcohol can be used to advantage during the se of many illnesses, more especially those of a more chronic re, and during the convalescent period. Sherry, brandy, whiskey port wine, when judiciously administered, are of definite e. Alcohol is easily oxidized, stimulates the appetite and tends rd a sense of well-being, particularly in the older patient. As omachic, if wisely prescribed, alcohol possesses considerable e.

ith the accompanying cachexia of carcinoma, sherry, malt ors, etc., can be used to advantage. Because of its vasodilator t, alcohol can be used for the relief of cardiac pain incident upon nary disease. When better vasodilators, such as the nitrates, not available, brandy may be used and is moderately effective. elieve the sense of depression which is often associated with the ratory diseases, more especially pneumonia, brandy is of real e, the amount to be judged somewhat by the previous habits e patient.

In chronic hyperacidity, as found in the presence of peptic
alcohol in all forms is contraindicated. In all diseases of the
hepatitis (catarrhal jaundice), cirrhosis, etc., alcohol shou
avoided. In genito-urinary infections alcohol is not advise
in nephritis it is allowable under certain circumstances (p. 24

Coffee and Tea.—In the average adult the usual consumpti
coffee and tea does little harm. They add to the palatabilit
enjoyment of the associated meal but contain practically no
the nutrient ingredients.

"*Tea* contains no theobromine but contains from 1.5 t
per cent of caffeine, the amount of caffeine depending more
the quality of the tea rather than upon its variety. Cheap
containing extraneous matter and low quality of leaf, will co
less caffeine than the same tea of high quality. The follo
table is taken from 'Allen's Commercial Organic Analysis:'*

TABLE 20.

Kind of tea.	Caffeine, per cent
Cheap Chinese	1.5
Chinese	2.9
Oolong	2.3
Congo	2.4
Japan	2.5
Indian	3.5
Ceylon	3.3
Java	3.4

"The amount of caffeine contained in an infusion of tea depe
upon several factors, among which are the quality and quantit
tea used in the preparation of the infusion, the ratio of tea to wa
used in making the infusion, the temperature at which the tea
steeped and the length of time required for steeping. When stee
in accordance with the official method, that is, the use of 60 pa
of boiling water to 1 part of tea, then the amount of caffeine remo
from the original leaf after three and five minutes' steeping is sho
by the following table of Tatlock and Thompson:

TABLE 21.

	Three minutes' infusion. %			Five minutes infusion. %		
	Max.	Min.	Av.	Max.	Min.	A
Caffeine	76	39	62	87	52	[illegible]

"The preceding table shows the average of 21 samples of tea
be 62 per cent after three minutes infusion and 77 per cent a
five minutes infusion, with a minimum of 39 per cent and 52
cent respectively."

The ordinary infusion of *coffee* contains 1 to 2 grains of caffe
per cup. If boiled during the preparation the amount of tannic a
increases. During the process of roasting the volatile oil *ka*
develops and gives the flavor and aroma. The following is the e
mated caffeine content for raw, roasted and decaffeinated coffee

* Furnished by the Tea Association of the U. S. of America through the cour
of F. C. Gephart, Ph.D.

offee tends to increase intestinal peristalsis, as the slight irritation used by the tannic acid present. As indicated, coffee and tea ain the purin body, caffeine, which has a definite diuretic action ccording to Voit (1936) a reduction of 23 per cent in target ency was observed in 10 soldiers subjected to six thousand tests wing the ingestion of coffee. Caffeine-free coffee did not dish their accuracy although it produced the same psychic and ioristic effects as the caffeinated beverage.

TABLE 22.

	Caffeine, per cent
Raw—beans dried at a high temperature	1.08
Roasted—beans dried, then roasted and then ground	0.82
Decaffeinated—unground beans exhausted with water in a vacuum and the resulting infusion treated with a solution removing the caffeine	0.03 to 0.13

offee and tea stimulate the nervous system, more especially the er centers and may temporarily induce mental clarity, facilitat- he reception of sensory impressions and the removal of the sense atigue. Definite impairment of sleep usually results from the umption of an amount equivalent to 6 grains of caffeine (5 to 6 of tea or 3 to 4 cups of coffee). There may result a slight vaso- ation of the peripheral blood-vessels. In the unaccustomed, blood-pressure rises slightly and then falls, the pulse is usually lerated, and a diuresis is evident. Overindulgence may bring it frequent premature cardiac contractions. Habitual users of e beverages show little, if any, effect on the rate, force and out of the heart.

ea and coffee directly stimulate the respiratory center and the iratory rate increases. There is a slight increase in the basal abolic rate reported by most observers.

he slight stimulating effect of tea and coffee makes these bever- valuable in the treatment of the more chronic diseases. In e gastritis with vomiting, tea or coffee is very well tolerated.

he use of tea and coffee is contraindicated in all conditions ciated with hyperacidity, more particularly in the presence of a tic ulcer.

hocolate and Cocoa.—Chocolate and cocoa are both products he cocoa bean, the seeds of which are fermented and roasted. *obromine* is the chief alkaloid therein and is present in amounts n 1 to 2 per cent. Cocoa has a carbohydrate content of 37 per and fat content of 28 per cent. In chocolate, the carbohydrate tent is 30 per cent and the fat 48 per cent. Because of the fat carbohydrate constituents, cocoa and chocolate tend to inhibit ric secretion. These analyses are of the dried products. When ed as a beverage they are materially reduced.

ondiments and Spices.—Condiments and spices owe their perties mostly to the volatile oils. Each has its characteristic or which determines its use in cooking. The classes are as ows:

timulating Condiments: Pepper (cayenne, paprika, white and ck), mustard seed, horseradish and salt.

Aromatic Spices: All-spice, pimento, anise, caraway, oil of ca
cinnamon, ground cinnamon, cloves, coriander, cumin seed, gi
mace and nutmeg.

Sweet Herbs: Bay leaf, dill seed, fennel, marjoram, sage, sav
thyme and sassafras.

Manufactured Extracts (fortified by alcohol): Vanilla, le
pineapple, cherry, orange, walnut and banana.

Miscellaneous Preparations: Catsup, Worcestershire, chili sa
mayonnaise and vinegar.

The condiments in moderation improve appetite because of th direct action on the taste buds. Digestion is aided only refle because of the increased stimulation of gastric secretion. Co ments in excess are irritating to the intestinal tract and to the re parenchyma. Traces of condiments are found as such in the urine

Tobacco and Its Effect on Diet.—Tobacco is in no sense a fo substance and cannot be considered a food adjunct. Howev tobacco does contain the alkaloid *nicotine*, and other volatile pr ucts which are absorbed. On chemical analysis of tobacco smo the composition depends to a great extent on the manner and ra with which the cigarette is smoked. The side-stream or smoke fr the lighted end of the cigarette ordinarily constitutes the great part of the actual material given off under combustion. This co tains a low concentration of carbon monoxide with a high percenta of nicotine. Smoke which has been sucked in contains an appr ciable amount of carbon monoxide. This has been estimated much as 8.3 cc. from each gram of tobacco smoked, which is approx mately the amount of tobacco in each cigarette. The amount nicotine in smoke sucked in, is much greater than that of the sid stream. This has been estimated at from 3 to 9 mg. from eac gram of smoked tobacco. Approximately 88 per cent of this absorbed. American brands of cigarettes average about 2.5 p cent nicotine.

Whether or not nicotine is the primary toxic agent in tobac smoke, it is interesting to note that nicotine is rapidly absorbe from skin and mucous membranes. Its main action is a bri stimulation of the sympathetic and parasympathetic gangli followed by a depression. The stimulation of the ganglia results a rise in blood-pressure. In addition to the nicotine and carbo monoxide, the aspirated smoke contains pyridine, aldehydes an volatile oils. These are generally considered of very little signif cance.

It has been variously demonstrated that those who inhale in th process of smoking absorb approximately eight times as much nic tine as those smokers who do not inhale. When we consider that, i the act of inhaling, the smoke is exposed to the mucous membran of the naso-pharynx and the lower respiratory passages, thus givin an indefinitely larger area on which the products of smoking ma condense, we may expect a greater deposition and consequen absorption of nicotine and other components than would result fro simply puffing the smoke in and out of the mouth.

at smoking has an effect on the cardiovascular system has been suspected. These disturbances are characterized princi- by phenomena of vasoconstriction which appear first in the ral, and then in the peripheral vessels. A rise in blood-pressure to 30 mm. of mercury, with an acceleration of pulse of 10 to 40 , is frequently found. The best explanation for the so-called pacco Angina" is that this is the result of the constrictive action bacco on the cardiac blood vessels.

noking also tends to stimulate the glands of the stomach to te hydrochloric acid. This is brought about by irritation of nucous membranes of the stomach and is not beneficial in any . Those who suffer from chronic hyperacidity or peptic ulcer ld avoid smoking entirely; if this is not possible, limit them- s to smoking after eating.

the more recent work done by Johnson and Short, the tempera- of the skin at the tip of the third finger was recorded in a ber of subjects while smoking. These subjects included non- ers as well as smokers. They found a consistent drop in periph- emperature, varying from 2° to 10° F., in these subjects. Those inhale showed a much greater drop in temperature than those did not inhale.

rther studies by Johnson and Short seem to confirm the work aggard and Greenberg that an increased blood sugar, as well her phenomena brought about by sympathetic nervous system ulation, also results from smoking. This they believe to be result of adrenal stimulation by nicotine through the sym- etics.

ausea, spasms of the intestines with diarrhea and constipation be caused by nicotine. Tobacco is naturally contraindicated hronic gastritis and peptic ulcer.

obacco amblyopia is the result of a toxic effect of nicotine causing ness of vision, derangement of accommodation and a dilated l. These symptoms appear before actual degeneration takes e. When smoking is discontinued the symptoms usually ppear.

SECTION IX.

SUPPLEMENTARY METHODS OF FEEDIN

Introduction.—In order to thoroughly understand any metho feeding, an appreciation is needed of both the mechanics and ph ology of digestion. Reference to other portions of this book readily furnish this material in condensed form.

It is necessary to institute artificial methods of feeding in ca where it is impossible to feed by the routine manner, or in ca in which the daily calories ingested are not sufficient to maint or augment body nutrition, *i. e.*, coma, alimentary obstructi anorexia, general debility, senility and in the insane. Additional artificial means of feeding are commonly utilized in the treatme of gastric and duodenal ulcers.

ABSORPTION OF FOOD ELEMENTS AND WATER.

Absorption of *carbohydrates* in artificial feeding is depende directly upon the form in which the carbohydrate is presented the body, as well as that portion of the alimentary tract with whi it comes in contact. The polysaccharides and disaccharides a less readily absorbed and assimilated than the monosaccharide Glucose, being a monosaccharide, is unquestionably the carb hydrate of choice. This is particularly true in rectal feeding. must be remembered that carbohydrate is not digested in th stomach. The initial change takes place in the mouth, and i resumed at the distal portion of the duodenum.

Fats begin to be absorbed beyond the pylorus. Refer to Physiolog and Chemistry of Digestion. In rectal feeding it is evident that th introduction of fat is not indicated.

Proteins undergo little or no change in the mouth. Their diges tion is begun in the stomach wherein the majority of protein undergo molecular disintegration and solution. The introductio of protein per rectum, or through fistular feedings in a lower portio of the intestinal tract, is theoretically improper.

Fluids in the form of water are absorbed throughout the intestina tract. Hence the administration of water by artificial means i a paramount procedure.

Supplementary feedings are divided as follows: Nasal feedin (*nasal gavage*), non-natural oral feeding (*oral gavage*). This i itself is subdivided into *gastric gavage* and *duodenal* and *jejuna gavage* or feeding. *Fistular* and *rectal feeding* completes the genera modes of usage.

NASAL GAVAGE.

The technique of nasal feeding (gavage) consists in the introduc tion, through the nares into the esophagus, of a well-lubricate small-sized stomach or duodenal tube. The size of the tube wi depend upon the bore of the nasal aperture. In a narrow nas

ture, or in an infant, a catheter may be used. It is very essen-before introducing the food elements to see that the tube or eter has not entered the larynx. This can be determined by ning for respiratory sounds at the proximal end of the tube. foods to be utilized in nasal feeding are the same as those for ric or duodenal feeding.

GASTRIC GAVAGE (ORAL GAVAGE).

astric gavage or forced feeding consists in the introduction of ous fluid foods, as milk, raw eggs, beef juice, beef extracts, etc., the stomach, by way of the mouth, through a stomach or lenal tube. Refer to Fluid Foods, Soft Foods and Foods for denal Tube Feeding.

astric and nasal gavage are the methods of choice in feeding unconscious. In these patients the procedure is not difficult ccomplish. It is equally essential in gastric and in nasal gavage e sure that the introduced tube has entered the esophagus and the larynx.

n gastric gavage the jaws must be kept open. This may be omplished by the use of a mouth gag or roller bandage. In dren the introduction of a finger, posterior to the molar teeth, serve as an efficient gag.

he tube to be introduced, if the feedings are to be periodic and continuous, should be the regulation stomach tube with per-nently affixed rubber funnel or supplementary glass funnel. en removing the tube it should be withdrawn rapidly in order to excite subsequent vomiting. Frequently, it is advisable to h the stomach with a normal saline or 5 per cent bicarbonate oda solution prior to introducing the feeding. This is particu-y essential in the presence of a gastric retention or hypersecretion.

t times the introduction of a duodenal tube for a continuous iod of a week or more may be necessary in order to increase ght or to maintain body nutrition. In cases of anorexia nervosa, ther types of neurasthenia, this procedure has proved to be of ue. The dryness and irritation of the posterior oro-pharynx often be offset by the periodic deglutition of a dram of equal ts of glycerin and lemon juice or the sucking of some glycerin-e lozenge.

aturally, in the periodic introduction into the stomach of the denal tube, the implement should be removed after each feeding. those cases in which the tube is retained in place throughout course of several feedings, it is essential to wash the tube by introduction of tap water or saline solution after each feeding, insure cleanliness. It is also necessary to clamp the proximal of the tube in order to avoid syphonage.

DUODENAL FEEDINGS.

uodenal and jejunal feedings are introduced through a duodenal e. This tube may be of several recognized varieties: The fuss, Einhorn, Levine or Twiss tube. Each of these tubes has

its advocates and its critics. In the writer's experience the T tube appears to be more free of criticism than any of the af mentioned. This tube, with a slightly larger bore than the avera has appended, distal to a modified bucket, an additional length rubber tubing, at the end of which is attached a solid ball. T ball acts as a protractor in introducing the tube through the pylor Additionally, the fenestrations in the modified bucket are of s caliber as to allow ready egress of the food particles. Patients w have experienced several types of tubes claim that it is easier

FOODS FOR DUODENAL TUBE FEEDING.

Acid milks
Albumen fruit juices
Albumen water (1 or 2 whites of eggs to glass of water)
Barley water
Beef juice
Bemax
Black coffee
Bouillon and broth
Butter
Buttermilk
Cereal gruels
Chocolate beverage
Clear and cream soups
Cocoa beverage
Cod-liver oil
Cream
Dextri-Maltose
Dryco
Eggs (raw)
Fruit juices
Fruit purées
Glucose (10% solution)
Honey
Karo
Klim
Lactose (10 to 20% solution)
Maple syrup
Malted milk
Milk, cow's or goat's
Olive oil
Ovaltine
Peptone solution (20 to 40%)
Peptonized milk
Protein Hydrolysate
Salt
Strained soups
Sugar
Tea, clear
Vegetable juices
Vegetable purées

swallow. Its passage through the pylorus is quicker than with th other tubes. It is readily adapted to duodenal intubation unde fluoroscopic control. This tube is not apt to regurgitate into th stomach following its passage through the pylorus. The meta materials are non-corrosive and readily cleansed; this is an impor tant feature in continuous feedings. The tubing is calibrated t indicate the area reached distal to the incisor teeth; in rotation gastric cardia, greater curvature, pylorus and duodenum (ampull of Vater).

The technique to be observed is that the patient should swallow the bucket as a piece of food. It should be well lubricated and preferably ice-cold. After the tube is passed into the stomach, th patient should recline on the right side in order to facilitate th passage of the tube through the pylorus. The position of the bucke can be ascertained by having the patient swallow a small quantity of milk or water, and if the same is promptly returned upon aspira

, it is positive proof that the bucket is still in the stomach. most satisfactory confirmation of the position of the tube is mplished by fluoroscopic examination.

he foods which may be introduced through the tube in nasal and gavage and duodenal feeding are dependent primarily upon the pose for which the feeding is indicated. In tube feeding for ric and duodenal ulcer, reference should be made to those foods gested by Einhorn. Otherwise, as is the case with the Einhorn ings, the foods should be liquid in type and of an easily digestible ure. The following foods (pp. 197-198) are recommended.

ll food in solid form must be puréed and strained, and milk or er diluent added to make proper consistency for passage through tube. Many commercial firms offer excellent canned, puréed or ined cereals, vegetables and fruits, which will obviate much sehold labor.

t is customary to make combinations of the noted food items, ending upon volumetric and caloric necessities. Alcohol and eine (in the form of coffee) are at times indicated. The manipu-on and combination of these foods, to accomplish the desired pose, places the responsibility upon the attending physician. caloric yield *per diem* can readily be calculated, and the volu-ric intake can be restricted or amplified as desired. Refer to pendix for Food Analyses.

he introduction of a diet too high in carbohydrates is not in-ted, as the customary oral digestion is self-evidently absent. ce, the addition of too much carbohydrate may produce oward intestinal symptoms.

TUBE FEEDING SCHEDULE.*

s outlined the feedings contain approximately 2800 Calories and grams of protein. Minerals and vitamins are adequate. If a ater caloric intake is required, it may be obtained by the addition ugar (sucrose, glucose, or lactose) to any feeding.

ixty ounces of fluid foods is considered the daily minimum. If rated, 100 ounces and upward should be given. It is expected t 1 to 2 pints of water will be taken every twenty-four hours.

luids should be warmed before administration. The tube is to washed after each feeding with 1 or 2 ounces of water.

he amount of each feeding is to be charted.

Feedings.

8 A.M.	Milk, 8 ounces Cream, 2 ounces Cereal gruel, 4 ounces
10 A.M.	Milk, 8 ounces Orange juice, 4 ounces Egg, 1

* As used at the New York Post-Graduate Medical School and Hospital.

12 NOON.	Milk,8 ounces Cream, 2 ounces Puréed vegetable 4 ounces Pinch of salt
2 P.M.	Milk, 8 ounces Cream, 2 ounces Cereal gruel, 4 ounces
6 P.M.	Milk, 8 ounces Cream, 2 ounces Puréed vegetable or fruit, 4 ounces
8 P.M.	Milk, 12 ounces Cream, 2 ounces Cocoa paste, $\frac{1}{2}$ ounce
10 P.M.	Milk, 8 ounces Cream, 2 ounces Cereal gruel, 4 ounces
2 A.M.	Milk, 8 ounces Orange juice, 4 ounces Egg, 1

FAT-POOR GASTRIC-TUBE DIET.

The author has had several occasions to institute continuous gastric gavage in cases of anorexia associated with fat intolerance. The following dietary regimen was successfully maintained in each instance:

8.30 A.M.	Farina cooked in milk, strained Peptonized milk added to bring total to 10 ounces Egg-whites, 5 Dextri-Maltose No. 1, 1 ounce
12.30 P.M.	Pureed prunes, 4 ounces Peptonized milk, 6 ounces Egg-whites, 3 Dextri-Maltose No. 1, 1 ounce Tomato juice, 1 ounce
4.30 P.M.	Cereal feeding as at 8.30 A.M.
8.30 P.M.	Feeding as at 12.30 P.M., using pureed carrots or peas in place of prunes and omitting the tomato juice
11.30 P.M.	Farina, 12 ounces Peptonized milk, 8 ounces Egg Dextri-Maltose No. 1, 1 ounce

NOTE.—From this sample it can be readily seen that the further infiltration of properly selected liquid or soft food items will increase the caloric intake when demanded. The salt should not exceed

el teaspoon each day. Excess salt alters the tissue osmotic on to such a degree as to produce uncomfortable symptoms. argest volume should be given at the last feeding. Refer to s for Duodenal Tube Feeding.

TE.—A word of caution is suggested referable to the technique odenal or gastric-tube feeding. The material introduced should ghtly above body temperature. The rate of introduction should ow in order to obviate overdistention of the duodenum or ach. The fat content cannot be excessive, due to the fact that troduction into the duodenum may result in gall-bladder and enal spasm. This is particularly prone to occur in the presence patic derangements. Often the mere presence of the tube (a gn body) in the duodenum may cause spasmodic pain or its rgitation into the stomach. The administration of belladonna ome form will often forestall this occurrence. The bucket ld not be allowed to rest on the greater curvature. The mark- of the duodenal tube indicate the relative position of the et when *in situ*.

FISTULAR FEEDINGS.

his form of supplementary feeding is to be used when obstruc- occurs in the course of the gastro-intestinal tract. The common ructions are malignant and benign stenoses of the pharynx, hagus, stomach, pylorus, etc. As a rule, in the presence of conditions, surgery has intervened, and a permanent opening ade into the stomach or jejunum for the purpose of feeding.

he method of nutrition through this direct opening is by means rectal or duodenal tube and funnel. The food items of choice poured into the funnel, and hence directly into the hollow organ. same precautions are to be observed in fistular feedings as are d under gastric gavage and duodenal feedings, with common e modifications. Naturally, due to the increased caliber of the utilized, food of thicker consistency may be used. In this a greater caloric yield can be obtained from a smaller volume. preceding statements are equally applicable to *jejunal fistulæ* the exception that fats in this latter instance should not too bly augment the diet. In all fistular feedings the patient is e to complain of a dryness of the mouth and throat. This can be allayed by chewing gum, glycerin-base lozenges or finely ked ice, the melted water from which should be expectorated.

he administration of a diet too high in carbohydrate is prone roduce intestinal distention. This is probably due in part to the ent absence of salivary digestion.

s referred to in other portions of this volume, it is important emember that feeding of broths and meat extractives yield or no nutritive value. They only supply the body with a ric acid stimulant, purins, mineral salts and—what is primary— s.

MURPHY DRIP.

By far, the most useful and satisfactory form of rectal no ment is obtained by the use of the Murphy drip. This consist gravity drop method of introducing a designated solution int lower bowel. In this way, without overloading the intestines, possible to furnish the body with 1 pint or more of water tog with some nutrition.

The nutrient element of choice is glucose. Sufficient gluco dissolved in ordinary tap water to make a 5 per cent solu This is allowed to constantly drip through a special mechanism the proximal end of the tubing. The distal end is inserted into rectum for a distance of 8 to 10 inches. The drip may be ei continuous or for the duration of a pint, after which a rest perio observed. The glucose solution should be kept warm, and initial flow be established at about 20 drops per minute. T should be increased to 40 drops per minute, depending upon tolerance of the patient. Too rapid dripping will often result expulsion. The same interfering factors in the form of re pathology as noted in nutrient enemata affect the efficiency of Murphy drip, but to a lesser degree. It is advisable to elimin the air column in the process of using the Murphy drip the same is observed in administering nutritive enemata. Normal sal solution offers the most expedient agent by which body tissue m be supplied with a fluid of no caloric value.

At best, the rectal administration of nutrients or fluids is sad inefficient when compared with the oral, subdermal or parente avenues of introduction.

The routine or thoughtless administration of fluids or nutrime artificially to a patient capable of taking these elements by t ordinary avenue, should be heartily condemned.

PART II.

THE DIETETIC MANAGEMENT OF DISEASES

DISEASES AND THEIR DIETS.

troduction.—The administration of food to the patient should me as important a rôle in the armamentarium of the practising sician as the apothecary prescription.

he recent trend has been to place less faith in drugs than herere and to curtail their use. A review of the therapeutic recomdations of the past shows certain drugs, once considered specific, e now been discarded. With the diminished importance of s in treating diseases, it is obvious that feeding in sickness mes more important.

he physician should be able to prescribe feeding with definite vledge of the presenting factors. Such accurate diet prescrip- necessitates a comprehensive knowledge of physiology, chem- and pathology, together with practical dietetic information. he administration of food and its fate in the human body are onymous with the much misused term metabolism.

etabolism is derived from the Greek, meaning "change." It is ned as the sum of all physical and chemical processes by which living and organic substance is produced and maintained. wth is classed under this term metabolism, which in turn is led into the process of building and the process of destruction. former is called *anabolism* (from the Greek, meaning "construc- change") and the latter *catabolism* (from the Greek, meaning structive change"). The genus nomenclature applicable to both ese processes is metabolism.

od is any substance which when ingested yields energy of an olic character or contributes to physiologic maintenance.

iet is a specified amount and type of food intended for a given ose. A basic diet is the minimum amount of food consistent the maintenance of the various factors of health.

ods may be divided into six classes, namely, carbohydrates, proteins, salts, vitamins and water.

l of these have been proved essential for proper metabolic ice. A deficiency in any of these specific elements produces adily demonstrable symptom-complex. On the other hand, rmal accumulations of any of these components likewise pro- physical entities.

e establishment of the proper diet in a specific case depends a number of factors:

An understanding of the pathologic condition presented.

A knowledge of the physiologic derangement which would render a normally balanced diet inadvisable.

An appreciation on the part of the physician of the individual characteristics of the patient.

An attitude of practical common sense which is often lacking on the part of the prescriber.

As we abhor symptomatic drug therapy, so do we dislike symp matic diet therapy. Nevertheless, there are many indications the practice of medicine when symptomatic diets must be institut for the maintenance of life and health.

It is intelligible that the prescription of a specific diet for a individuals suffering from the same disease is impossible. Any die based on sound physiologic principles, will *in toto* be found app cable only to a minority of cases. It is essential, however, for th physician to have some basic outline from which specific modific tions can be made.

Diet has become better recognized as a factor in the practice o medicine, due to the better understanding of foods and their poter tialities. Time devoted to dietetic study has been well repaid b the clinical results observed.

In these days of propagation of fads and fancies the realm o dietetics has not been left unexploited. It is difficult for th practitioner to evaluate the various food fads and diets which ar repeatedly coming to his attention.

A working hypothesis, applicable to dietetics, patterned afte that of the famous Koch, is herewith presented.

"The proper attitude to assume in reference to any newly developed diet is to check its principles against sound, known physiologic demands. When these are fulfilled by any new regimen, and when such factors as palatability and avoidance of monotony are accomplished, together with successful demonstration of clinical response under competent observation, then such a dietary is worthy of institution and commendation."

Therapeutic diets should entail the least possible modificatio of the normal ration. Each should be thought of in terms of specific variation. If the patient readily comprehends the exac nature of the modification, intelligent coöperation can be secure The reducing diet, for instance, must be adequate in every particu lar except calories. Other diets involve restriction of salt, wate fiber, sugar, protein, etc., while still others require that these sam items be consumed in more than average amounts. The physiologi penalties of the restriction or "forced" feeding must be taken int account.

-though a monotonous and most uninteresting diet may be -nged so as to be adequate according to present standards, it is -rable to employ a wide variety of foods wherever practicable. -expanding knowledge of the part played by vitamins in the diet -esulted in much emphasis upon these factors. Munsell (1940) -ssued a timely suggestion in this regard:

-give very careful attention to sources of vitamin B_1 in the diet. - more difficult to obtain an adequate amount of this vitamin - any of the others. It is probably the one in which American - are most deficient. Take special care to conserve the vita- B_1 in foods during cooking. Many of the foods that contain -bundance of vitamin B_1 are cooked before being eaten and next -tamin C, vitamin B_1 is the vitamin most likely to be lost when -s are cooked or canned. The precautions necessary to conserve -nin B_1 will conserve other vitamins as well."

- all times it is essential to consider the economic status of the -ent. Except in very unusual circumstances it is possible to -pt therapeutic diets to the presenting need. Adequate low-cost -s are analyzed on page 598. Competent hospital dietitians, -are organizations, relief agencies and local committees are pre- -d to coöperate in intelligent and humane provision for the -etic care of the sick.

ACIDOSIS (NON-DIABETIC KETOSIS).

-iscussion.—All physicians are confronted with acidosis of non- -etic origin—one in which the ketone bodies, together with the -one breath, are prominent. Acidosis *per se* is but a symptom of -etes or some other underlying disorder. Attention must be -cted to this condition in order to hasten convalescence and at -same time alleviate the presenting symptoms.

-asically, the cause of all ketosis is directly or indirectly one of -vation. Whether this starvation is a result of diabetes, vomiting, -rhea or anorexia, etc., must be fully considered in the manipu- -n of a dietary régime. The old adage, "Fat burns in a carbo- -ate flame," is still true. The interpretation is that fats are -operly combusted in the human body when sufficient carbo- -ate is not present. This well-known fact pertains both to the -enous fat-carbohydrate ratio and to the endogenous balance.

- general, the diet indicated for ketosis is fat-free and high- -ohydrate and must vary materially with the underlying con- -n. It would be as unwise to prescribe coarse vegetables in -presence of continuous vomiting as it would be foolish to pre- -e baby food for a fully capable stomach and intestines.

-e selected foods are cereals, tubers and any combination of -s in which fat is omitted or markedly limited, and to which - has been added. This includes desserts, certain types of cakes, -ls, puddings, fruits and fruit juices. In addition, stewed

fruits, marmalades, jams and candy, particularly of the hard var or soft gum drops, are especially useful when tolerated. Comme fat-free butter may be permitted for palatability.

Though the presenting case may not be of diabetic origin, it been found useful at times to prescribe insulin in conjunction a high-carbohydrate diet.

Typical Menu.

Breakfast:

Fruit
Whole grain cereal, cooked *or* prepared, with milk and sugar
Toast *or* rolls with marmalade *or* honey
Coffee with milk and sugar

Luncheon:

Choice: potatoes, macaroni, noodles, rice, spaghetti, vermice
Cooked vegetable
Salad with lemon juice
Bread with jam
Fresh *or* stewed fruit
Tea with lemon

Dinner:

Vegetable *or* fruit juice
Lean meat *or* fish
Potato
Cooked vegetable
Bread with jelly
Choice: fruit, cornstarch, rice, tapioca pudding
Coffee with milk and sugar

ACNE ROSACEA AND ACNE VULGARIS.

Refer to pages 287 and 288.

ADDISON'S DISEASE.

Joseph Eidelsberg, M. D.

Discussion.—Whereas there is no specific diet for this conditio the very frequent incidence of gastric juice deficiency with associat bowel looseness or definite diarrhea must receive some dieta consideration.

The diet recommended should be one to increase gastric acidi and at the same time not be too high in roughage. The latter su gestion is based on the fact that in diarrhea the intestines a already highly irritable and the taking of roughage will tend furth to aggravate this condition.

The rôle of vitamin C has been proved efficacious in numero instances.

The oral administration of dilute hydrochloric acid will change t gastric secretion and indirectly aid in checking the loose bow

f the chief symptoms of patients suffering from Addison's
e is weakness. The addition of extra protein to the diet will
ntly offset this manifestation.
as been proved that a diet high in sodium serves admirably
intain the body tissue fluid. The following menus are so
ged as to contain a large amount of sodium chloride in addition
eting other requirements.
lize salt as generously as palatable in food preparation. When
ppetite permits, use some bread, butter and milk at each meal
ve between meals. Salted crackers and cheese may also be
l between meals. The use of olives, pickles and such relishes
ontribute to the salt content of the menus
it.—Foods of a bland and alkaline nature which tend to reduce
ydrochloric acid content of the stomach. In the event of
ing, either starvation or a bland diet given in small quantities
quent intervals may be indicated.

Typical Menu.

kfast:
uit
oked cereal with cream and sugar
oice: broiled bacon, ham, creamed chipped beef, creamed salt
ish
ast *or* rolls with butter
lk *or* coffee with cream and sugar
heon:
uillon *or* consommé with salted crackers
oice: meat, fish, egg, cheese
oice: potatoes, macaroni, noodles, rice, spaghetti, vermicelli,
with butter
oked vegetable: beets, string beans, carrots, spinach, squash,
tomatoes, peas, with butter
ead with butter
ewed fruit
lk
ner:
ves *or* pickles
up
eat *or* fish
tato with butter
oked vegetable
ead with butter
oice: stewed fruit, simple pudding, cheese with salted crackers
ilk *or* coffee with cream and sugar

the management of vomiting, the diet is the same as for any
ting of non-obstructive etiology. Frequently, a dry diet ad-
tered in small quantities, in which the carbohydrates are
and the fats reduced to a minimum to offset the associated
sis, has proved beneficial.

Stimulants such as contained in coffee, tea and cocoa may used to counteract associated weakness. The patient must a physical and mental fatigue. Mild acute infections should attended to *without delay*.

The high-salt diet must be accompanied by ample supplie water. Forced ingestion of water *per se* is ineffective in prevent development of hemoconcentration in adrenal insufficiency. Insu cient water with a high-salt intake may induce crisis. The d should be low in potassium. Diets of various potassium cont are presented for judicious use. According to Zwemer and Tru kowski there is also a diminished potassium tolerance in asthen not frankly of the Addisonian type. It should be emphasiz that if the adrenal glands are normal, restriction of sodium chlor and administration of potassium salts involves no apparent ri but in severe adrenal insufficiency there is grave danger of collap

The administration of desoxycorticosterone esters to patien with Addison's disease causes a retention of sodium and water su that it is not necessary to ingest large quantities of salt. Excessi amounts of this drug lead to the development of hypoproteinem marked edema and cardiac insufficiency (Ferrebee *et al.*, 1939).

For the diagnosis of Addison's disease, the procedure of Cutl may be used. The diet shown in Table 20 is followed for three day On the first day, free ingestion of water is encouraged. On t afternoon of the first day, additional potassium is given in the for of potassium citrate (dose, 42 mg. of the salt per pound).

On the second day the allowance of fluid is 40 cc. per kilogran During the morning the dose of potassium citrate is repeated.

TABLE 23.—**Foods Arranged According to Potassium Content.***

A. Meats, etc.; B. Vegetables; C. Cereals; D. Fruits; E. Beverages; F. Miscellaneou

Group 1. 0.0 to 0.1 per cent K: **A. cheese, oysters; B. okra; C. wheat gluten, whi rice; D. blueberries, cranberries, huckleberries, pomegranate, watermelon; E. te cider, huckleberry wine, milk (buffalo, human, mare); F. butter, sugar.**

Group 2. 0.1 to 0.2 per cent K: **A. bacon, eggs, round clams; B. asparagus, cucum bers, egg-plant, green peppers, leeks, onions, summer squash, sweet corn; C. bre (rye and white), crackers, farina, hominy, macaroni; D. apples, blackberri gooseberries, grapefruit, grapes, lemons, oranges, pears, raspberries, strawberri E. juices of foregoing fruits, buttermilk, cocoanut milk, cream, milk (cow, cam goat, sheep); F. jellies and jams, vinegar, whey.**

Group 3. 0.2 to 0.3 per cent K: **A. clams (soft, long); B. cabbage, carrots, cau flower, peas (fresh), radishes, string beans, tomatoes, water cress; C. bar (pearled), corn-meal, millet, whole wheat flour, bread (Boston brown, graha whole wheat); D. apricots, breadfruit, cantaloupe, cherries, citron, currants, ma goes, muskmelon, peaches, persimmons, plums, whortleberries; E. juices (aprico cherry, tomato); F. capers, maple syrup, wheat-germ.**

Group 4. 0.3 to 0.4 per cent K: **B. beets, Brussels sprouts, celery, chard, co (mature), endive, kohlrabi, lettuce, mangold, mushrooms, pumpkin, romai rutabagas, turnips, turnip tops, sweet potatoes, winter squash; D. figs, guav limes, mammee, pineapple, rhubarb; F. cocoanuts, honey, pecans, walnuts**

Group 5. 0.4 to 0.5 per cent K: **A. caviar, fish, red meats; B. horse-radish, potato truffles; C. barley (whole grain), flour (graham, rye), rye (whole grain), whe (whole grain); D. bananas; F. dandelion.**

Group 6. 0.5 to 7.3 per cent K: **A. meat peptone, solid meat extract; B. beans, ca bage greens, cow-peas, lentils, Lima beans, lupines, olives, parsnips, spina C. cotton, flax, and linseed-meal, wheat bran; D. dried fruits (e. g., currants, fi peaches, prunes, raisins); E. cocoa; F. almonds, chestnuts, chocolate, dri cocoanut, hazelnuts, molasses, mustard, paprika, peanuts, pepper.**

* Ashkins, V., and Zwemer, R. L.: Jour. Am. Dietet. Assn., **14**, 183, 1938.

Sample Menu Containing 1 Gram K

Food.	Grams.	Measure.	Potassium.
kfast			
ange	100	1 weighed with skin	0.177
rina	20	$\frac{1}{8}$ cup	0.024
ead (white)	30	1 slice	0.032
itter	14	1 T.	0.0018
ilk	50	$\frac{1}{4}$ glass	0.072
eam	50	$\frac{1}{4}$ glass	0.063
gar	13	1 T.	
ier			
ieese	50	$\frac{1}{5}''$ slice (5 lb. long loaf)	0.045
acaroni	20	$\frac{1}{5}$ cup	0.026
eet corn	100	1 ear, 8″ ($\frac{1}{2}$ c.)	0.113
ueberries	100	$\frac{2}{3}$ cup	0.051
ead (white)	30	1 slice	0.032
itter	14	1 T.	0.0018
eam	50	$\frac{1}{4}$ glass	0.063
per			
gg	50	1	0.070
sparagus	50	6—5″ stalks	0.098
ople	100	1 small	0.127
ead (white)	30	1 slice	0.032
itter	14	1 T.	0.0018
eam	50	$\frac{1}{4}$ glass	0.063

ls: Approx. P. 53, F. 91, C. 150 grams, Cal. 1630. Potassium, 1.0994 grams.

Sample Menu Containing 2 Grams K

Food.	Grams.	Measure.	Potassium.
ikfast			
range juice	100	$\frac{1}{2}$ glass	0.182
arina	20	$\frac{1}{8}$ cup	0.024
ggs	100	2	0.140
read (white)	30	1 slice	0.032
utter	14	1 T.	0.0018
Iilk	100	$\frac{1}{2}$ glass	0.143
ream	100	$\frac{1}{2}$ glass	0.126
igar	13	1 T.	
ner			
heese	50	$\frac{1}{5}''$ slice (5 lb. loaf)	0.045
otatoes	50	$\frac{1}{2}$ ($2\frac{1}{2}''$ diam.)	0.214
arrots	50	$\frac{1}{3}$ cup (drained)	0.123
lueberries	100	$\frac{2}{3}$ cup	0.051
read (white)	30	1 slice	0.032
utter	14	1 T.	0.0018
Iilk	100	$\frac{1}{2}$ glass	0.143
ream	50	$\frac{1}{4}$ glass	0.063
per			
gg	50	1	0.070
orn, sweet	100	1 ear, 8″ ($\frac{1}{2}$ c.)	0.113
ummer squash	100	$\frac{7}{10}$ cup	0.150
ears	100	1 medium	0.132
read	30	1 slice	0.032
utter	14	1 T.	0.0018
Iilk	100	$\frac{1}{2}$ glass	0.143
ream	50	$\frac{1}{4}$ glass	0.063

ls: Approx. P. 74, F. 121, C. 169 grams, Cal. 2060. Potassium, 2.0264 grams.

Sample Menu Containing 4 Grams K

Food.	Grams.	Measure.	Potassium
Breakfast			
Oranges	200	2 weighed with skin	0.354
Corn-meal	20	$\frac{1}{8}$ cup	0.043
Eggs	100	2	0.140
Bacon	20	2 slices ($1\frac{1}{2}$ x $4\frac{1}{2}$ x $\frac{1}{8}''$)	0.034
Bread	60	2 slices	0.064
Butter	7	$\frac{1}{2}$ T.	0.0009
Milk	200	1 glass	0.286
Cream	100	$\frac{1}{2}$ glass	0.126
Dried currants	30	$\frac{1}{5}$ cup	0.262
Dinner			
Meat or fish	50	Slice, 2 x 2 x $\frac{1}{4}''$	0.250
Potatoes	100	1 ($2\frac{1}{2}''$ diam.)	0.429
Peas	100	$\frac{3}{4}$ cup	0.285
Tomatoes	100	1 ($2\frac{1}{2}''$ diam.)	0.275
Pears	100	1 medium	0.132
Bread	30	1 slice	0.032
Butter	7	$\frac{1}{2}$ T.	0.0009
Supper			
Meat or fish	50	2 x 2 x $\frac{1}{4}''$	0.250
Carrots	100	$\frac{4}{5}$ cup	0.287
Cauliflower	100	1 cup	0.222
Peaches	100	1 medium	0.214
Bread	30	1 slice	0.032
Butter	7	$\frac{1}{2}$ T.	0.0009
Milk	200	1 glass	0.286

Totals: Approx. P. 86; F. 87; C. 210 grams; Cal. 1970. Potassium, 4.0057 grams.

Sample Menu Containing 6 Grams K

Food.	Grams.	Measure.	Potassium
Breakfast			
Bananas (E.P.)	100	$\frac{3}{4}$ c. or $\frac{1}{2}$ large	0.401
Corn-meal	20	$\frac{1}{8}$ cup	0.043
Eggs	100	2	0.140
Bacon	20	2 slices ($1\frac{1}{2}$ x $4\frac{1}{2}$ x $\frac{1}{8}''$)	0.034
Bread	60	2 slices	0.064
Butter	7	$\frac{1}{2}$ T.	0.0009
Milk	200	1 glass	0.286
Cream	100	$\frac{1}{2}$ glass	0.126
Dried raisins	50	$\frac{3}{8}$ cup	0.410
Dinner			
Meat or fish	100	2 x 2 x $\frac{1}{4}''$	0.500
Potatoes	100	1 ($2\frac{1}{2}''$ diam.)	0.429
Winter squash	100	$\frac{7}{10}$ cup	0.320
Peas	100	$\frac{3}{4}$ cup	0.285
Peaches	100	1 medium	0.214
Bread	30	1 slice	0.032
Butter	7	$\frac{1}{2}$ T.	0.0009
Milk	200	1 glass	0.286
Dried currants	30	$\frac{1}{8}$ cup	0.262
Supper			
Meat or fish	100	2 x 2 x $\frac{1}{4}''$	0.500
Potatoes	100	1 ($2\frac{1}{2}''$ diam.)	0.429
Turnips	100	$\frac{5}{8}$ cup	0.338
Tomatoes	100	1, $2\frac{1}{2}''$ diam.	0.275
Pineapple	100	$\frac{2}{3}$ cup, diced	0.321
Bread	30	1 slice	0.032
Butter	7	$\frac{1}{2}$ T.	0.0009
Milk	200	1 glass	0.286

Totals: Approx. P. 112; F. 110; C. 270 grams; Cal. 2520. Potassium, 6.0157 grams

n the third day 20 cc. of fluid per kilogram is given before .M. Urine is collected from 8 A.M. to noon. The test period is ninated at noon with intravenous injection of 1 liter of sterile tion containing 50 grams of glucose, 10 grams of sodium chloride, ams of sodium citrate, and 20 cc. of an active preparation of ical hormone. Since this provocative procedure may precipitate apse, the latter solution should be in constant readiness during three days.

he urine output of water is computed and the chloride concen-ion determined. Normals excrete more water (average 4 cc. per nute) than do those with Addison's disease (average 1 cc. per nute). A concentration of less than 125 mg. Cl per cent is arded as normal. Values in excess of 225 mg. indicate abnor-ity of adrenocortical function. Intermediate values are incon-sive and demand a longer salt-deprivation period.

ABLE 24.—**Low-salt, High-potassium Diet (Expressed in Grams).***

Items.	Break-fast.	Dinner.	Supper.	K	Na	Cl
etables:						
nned tomatoes	...	90	...	0.270	0.010	0.340
ettuce	...	10	10	0.060	0.005	0.015
t:						
eaches	...	100	...	0.125	0.022	0.004
range	100	...	...	0.200	0.012	0.006
rapefruit	...	...	100	0.200	0.004	0.005
anana	...	...	100	0.400	0.034	0.125
etables:						
anned peas	...	...	100	0.125	0.013	0.024
aked potato	...	100	100	1.000	0.042	0.076
ad, salt-free	50	30	30	0.110	0.073	0.127
o	...	150				
ter, salt-free	10	10	10	0.003	0.021	0.049
am, 20 per cent	25	25	75	0.158	0.044	0.100
k	...	...	200	0.300	0.102	0.212
ee, medium	300	200	...	0.500		
s	(1)	...	...	0.070	0.071	0.053
f, lean (weigh before cooking)	...	75	50	0.465	0.131	0.117
7	20	20	20	0.076	0.008	0.002
Total				4.062	0.592	0.949

Cutler, H. H., Power, M. H., and Wilder, R. M.: Jour. Am. Med. Assn., **111**, 1938.

ALCOHOLISM.

Discussion.—The treatment of alcoholism consists, first, in ptying the bowels of any food accumulation. For this purpose in or medicated enemata or colonic irrigations may be used. stric lavage is indicated particularly in the presence of pyloric sm, gastric hyperacidity or vomiting. Insistence should be placed the use of large amounts of fluid either by vein or by mouth ch will tend to promote renal activity and hasten the elimina-n of the already absorbed alcohol. 5 per cent glucose in saline to ch 100 mg of thiamine chloride has been added should be given ravenously to combat dehydration and acidosis.

econd, the diet should be fluid or semi-fluid and prescribed both quently and in small quantities. As soon as possible the caloric

14

value of the food should be raised in order to afford the body abu dant nourishment. The diet should predominate in carbohydrate with a diminished fat content. Foods capable of gastric acid sti ulation to offset alcoholic deprivation are beneficial.

The question of partial or complete withdrawal of alcohol one which is subject to much controversy. The author's feelin is that strict, sudden cessation of the offending factor, particular in chronic alcoholics, is of more harm than benefit.

Typical Menu.

8.00 A.M.	Fruit juice
	Black coffee *or* clear tea with sugar
10.30 A.M.	Gruel with milk and sugar
12.00 NOON	Highly seasoned broth *or* cream soup.
3.00 P.M.	Milk, buttermilk *or* eggnog
5.30 P.M.	Fruit *or* vegetable juice
	Custard, gelatin, junket, ice-cream *or* sherbet
8.00 P.M.	Hot milk *or* cocoa

Commonly in chronic alcoholism a gastric hypoacidity ensue This condition requires a diet similar to that for achylia gastrica See dietary suggestions under Gastric Hypoacidity.

Since alcohol ingestion intensifies the demand for vitamin B_1 symptoms of thiamin deficiency may be expected in these patients "Alcoholic insanity" is now believed to be due to lack of vitamin B rather than to alcohol (Williams, Mason and Wilder, 1940). 10 mg. of thiamin hydrochloride should be provided daily for these patients during the acute phase of their illness.

Delirium Tremens.—The treatment of this condition has been discussed by Bowman, Wortis, and Keiser. To combat the dehydration and restore the blood chlorides, capsules containing 2 grams of sodium chloride may be given every four hours. The fluid intake should be 3000 to 4000 cc. per day. A high caloric, high vitamin diet should furnish 3000 to 4000 Calories daily.

ALLERGIC DISEASES.

W. C. SPAIN, M.D.

Discussion.—The most commonly recognized forms of hypersensitiveness in man are bronchial asthma, hay fever, allergic coryza, urticaria, angioneurotic edema, certain forms of allergic dermatitis, of allergic gastro-enteritis, certain forms of purpura, of migraine, and of Meniere's disease. All of these conditions are classified under the designation of "allergy," and are due to contact with the exciting substances, usually protein in nature, by inhalation, by ingestion or by absorption from an infective focus.

With the exception of seasonal hay fever or pollinosis, which is a form of allergic coryza, any of the clinical allergic conditions mentioned may be manifestations of food sensitiveness. Correctly considered allergic are the acute gastro-intestinal symptoms so easily mistaken for those of a surgical abdomen, with nausea, vomiting,

ention, epigastric or abdominal pain, diarrhea and collapse, e disturbances following the ingestion of a specific food excitant. idespread rash or asthma is often an accompaniment. Vague, well-defined, chronic abdominal complaints, such as bad breath, rexia, constipation, dull abdominal pains, have also been classi- as allergic. Types of epilepsy, arthritis, acute bladder dis- bances, uterine irregularities, herpes simplex, gastric ulcer, epi- ritis, pruritus ani, fever, malaise, vertigo, malnutrition and many er complaints have been classed by various investigators under heading.

he majority of cases of food sensitiveness occurs in early life. n a study of 200 cases of bronchial asthma it was found by acutaneous tests that only individuals of three years or younger eloped symptoms from foods alone. After that age the inhalant stances such as pollens, dusts, feathers, etc., gradually replaced food sensitiveness, so that by the age of ten to twelve years majority of patients had lost the food reactions clinically, hough the skin sensitiveness often remained. In only 5 per cent adult asthmatic patients was it possible to demonstrate a food sitiveness as the sole offending factor.

he explanation for this sensitization to foods early in life is known. Formerly it was thought that this condition was due to efective gastro-intestinal membrane which allowed unaltered pro- n to be absorbed into the circulating blood, thus sensitizing the ividual. That such absorption occurs normally, however, has n shown by several investigators, chiefly by DuBois, Schloss l Anderson, who found strong proof of the absorption of unal- ed protein in the blood of non-sensitive infants, and by Brunner l Walzer who showed that unaltered protein could be normally sorbed into the circulation within one-half hour of ingestion of the d.

he food or foods causing attacks vary in different individuals hough a constant in any particular patient. Any article or icles of diet may be the exciting factors—eggs, milk, cereals, ats, fish, vegetables, fruits, spices, nuts or beverages. The con- ion of specificity, so characteristic of the allergic state, renders mpossible to devise a diet which would be correct for the great jority of sufferers. In the consideration of any allergic patient, reactions to the various foods become a highly individual blem, to be studied in detail.

he methods used in determining sensitiveness to foods are (1) history, (2) the cutaneous tests and (3) the clinical tests.

History.—An accurate history is of great importance since it often nishes the chief means of ascertaining the offending substances. eral points should be particularly emphasized. First, the estab- ment of the allergic nature of the attacks, since it is in this dition that the cutaneous tests are of value and the results of atment more likely to be successful. The presence particularly bronchial asthma, hay fever, allergic coryza, or dermatitis in the ient or in the antecedent or collateral family history, furnishes

strong evidence of the inherited and hence, allergic, nature of the food reaction.

A second point of importance is a description of the attacks, the frequency, intensity and duration, and relation to meals. The attacks may be acute or explosive in nature, with periods of normal behavior between paroxysms, their occurrence depending on the occasional contacts with the specific excitant, or they may be cumulative, being due, not to foods infrequently eaten but to the gradual storing in the body of toxic products from some food substance or substances daily present in the diet, but apparently non-irritating until the limit of tolerance has been reached.

Any periodicity or regularity of the attacks should be observed and their relation to daily, weekly or monthly routine of the patient noted. In a young woman who had suffered for years from sick headache each Monday, the causative factor, egg, was established not by skin test, which was negative, but by discovering that only at Sunday breakfast were eggs eaten. In the acute type of attacks the reaction time between ingestion of the food excitant and the appearance of the symptoms varies in different individuals, from a few seconds to several days, a condition which adds to the difficulty of diagnosis. Generally, however, the more acute the attack, the shorter the reaction time.

Symptoms of utmost gravity, dyspnea, cyanosis and collapse, have been known to develop in egg-sensitive children the moment a minute amount of egg has come into contact with the lingual and buccal mucosa long before ingestion could possibly occur. Indeed, actual contact with the excitant is unnecessary for the development of symptoms in exquisitely sensitive cases. The odor emanating from such foods, as fish, celery, or onion has alone been sufficient to produce, in extremely susceptible persons, violent asthmatic and coryzal attacks. A patient has been seen so sensitive to fish, that merely passing a fish market would cause severe attacks of asthma. Another patient would suffer severely from asthma whenever entering a dining room where celery was on the table, or whenever driving past celery fields, even during non-pollenating seasons. There are also food cases so exquisitely sensitive that mere contact of the food with the unbroken skin will produce severe symptoms of asthma, urticaria or dermatitis. A physician working in the Asthma Clinic at the Post-Graduate Hospital, New York City, is so sensitive to egg that rubber gloves are worn whenever the testing of egg extract upon a patient is necessary. Many cases, especially in kitchen workers, have been recorded where it has been necessary to peel potatoes or onions under water to prevent reactions.

Even in the less explosive types of food intolerance where the reaction time is longer and the symptoms more chronic in type, a close questioning may reveal the causative factor especially in children, where the history of an aversion to a particular food or foods is often highly significant. Such a dislike may frequently indicate the specific excitant, although the child's attitude, Nature's protective effort, may be interpreted by the parent or physician

nerely evidence of a whim or fancy. There are many asthmatic l undernourished children who, sensitive to milk or egg, are forced take these foods because they are "good for them," whereas eality these substances are the very causes of the complaints.

A third point of importance in the history is the consideration in ail of the patient's usual diet; the amount of milk consumed ly; the number of eggs; the varieties of meat, fish, fruits, vegeles and nuts; the amount of chocolate and cheese; the use of fee and tea. Any food or beverage taken intemperately should suspected. A young woman, suffering from chronic urticaria, yza and loss of weight, was found to be drinking 2 quarts of k daily. Cutaneous tests were negative to milk but by simply noving it from the diet she lost her urticaria and coryza and ned rapidly in weight. In another instance large quantities of hocolate drink were being given a child with eczema. Removal this substance, negative by cutaneous test, cleared the condition. chronic food sensitizations such as urticaria and migraine where history and cutaneous tests offer little aid, it is of benefit to ve the patient keep a complete diary of his food intake, which n be studied in relation to the attacks. Frequently in this way ly, a clue to the causative factors can be obtained.

Cutaneous Tests.—The importance of cutaneous testing as an aid determining the diagnosis in allergic conditions is well estabhed, and the procedures employed, both intracutaneous and scariation methods, are too well known to warrant describing them re. In this connection, however, several important facts should emphasized: (1) positive food reactions are most frequently cited in those cases presenting in themselves or in their family history of asthma, hay fever, allergic coryza or allergic eczema;) negative food reactions upon test, with positive clinical histories e common, particularly in urticaria, angioneurotic edema, miaine and the vague clinical forms mentioned above; (3) many se positive reactions are obtained which cannot be verified and nnot be explained. The reasons for the negative reactions are ly partially known. Cooking frequently may so alter foods that sting with the unheated protein is unsuccessful. Further, the echanism of food sensitiveness may differ in the different types food cases. The time element or incubation period is very imporat; unless the time elapsing between ingestion of the foods and e appearance of symptoms is thirty minutes or less, negative ults by test usually occur. It is illogical to expect an immediate sitive wheal upon test with the extract of a food that in the tient requires hours to cause apparent symptoms.

Clinical Tests With Foods.—In its simplest form, such clinical tests sist of removing from the patient's diet as completely as possible se foods found positive by skin tests as well as those implicated the patient's history or strongly suspected by him even in the sence of a negative skin test. Thus it may be necessary to nove a number of foods at the same time, a feasible procedure ept in the cases of infants and the elderly, where the simultaneous

avoidance of such important foods as egg and milk should not attempted. If the patient becomes symptom free, the foods remo may be added to the diet singly, with at least three days for ob vation between additions.

If such simple procedures are unsuccessful, they may be bann from the menu on purely empirical grounds, those foods listed bel known to be the chief offenders both because of high incidence an production of severe symptoms. Modern methods of processin and blending food substances often render perplexing and difficul the identification of foods which are the constituents. Therefor it becomes highly important for the physician to describe to th patient carefully and in detail, the foods and food substances t be avoided.

The Chief Offending Foods.—While experience has shown that al foods must be suspected as excitants in food hypersensitivenes there are several others more prominent as regards both inciden and ability to produce clinical symptoms. Investigators generally agree that these are egg, wheat, milk, fish and shellfish, meats chocolate, and nuts.

Egg is probably the most important of all foods in this connection, particularly in infancy and in early childhood, not only because sensitizations then are comparatively frequent but also because the symptoms produced may be most severe. Not only asthma, coryza, urticaria and migraine are often caused by this excitant, but also infantile eczema and allergic dermatitis, both by ingestion and by contact with the unbroken skin, as previously noted. Such egg intolerance can apparently be inherited, as in the family described by La Roche and Richet, where gastro-intestinal symptoms from egg were known in four generations. Sensitiveness to chicken meat frequently is obtained in egg-sensitive cases.

EGG-POOR DIET

Avoid:

Eggs: fresh, frozen, powdered, cooked in any form.
Egg-containing foods: such as
- Prepared flour mixes for home cooking
- Pancakes, griddle cakes, pastries
- Waffles, doughnuts, pretzels
- Macaroons, meringues, frostings
- Cakes, cookies, unless known to be egg-free
- Salad dressing, unless known to be egg-free
- Ice cream and sherbets, unless known to be egg-free
- Custards, cream candies, fondants
- Marshmallows
- Breads with glazed crusts
- Sausages, croquettes, meat cakes containing egg as binder
- Foods breaded with egg mixture
- Poultry, especially chicken

Where egg is to be avoided in the diet the difficulties are many, due to the numerous ways in which it is employed. Even the breast-fed infant may obtain egg through the mother's milk. Egg-white is used as a "binder" in a variety of water-color paints known

"Tempera." A case is recorded where eczema from egg devel-
d from this source.

heat may cause symptoms of asthma, coryza, migraine, urti-
a and eczema not only by ingestion and contact, as does egg,
also by inhalation. Bakers, wall-paperers, grain dealers and
lers have been described as cases with such wheat sensitization,
ma and coryza being the usual symptoms. Such inhalant cases
difficult to treat successfully and frequently a change in occu-
ion may be necessary. A patient may have any one or any
bination of symptoms as a result of wheat contact. The other
als, rice, barley, corn, rye and oats, are similar in action to
at. Buckwheat, although botanically unrelated, is included here.
ere wheat or other cereals must be eliminated from the diet it
uld be recalled that coffee substitutes are chiefly cereal.

WHEAT-POOR DIET

Avoid:

ite, whole wheat, cracked wheat flour in breads, waffles, griddle cakes,
oughnuts, muffins, pastries, pies, cakes, crackers, spaghetti, macaroni,
oodles, pretzels, zwieback
n bread, unless known to be wheat-free
bread, unless known to be wheat-free
bread, unless known to be wheat-free
ten bread
akfast cereals, dry or cooked, containing wheat, whole wheat, farina
r bran
tards, gravies, sauces containing wheat
aded foods prepared with wheat
fee substitutes containing wheat, beer, ale
pared meats, as sausages, frankfurters, meat loaf, croquettes made with
wheat

Milk is an important offender particularly in infants and children.
mptoms identical in variety with those caused by egg and wheat
found, although rarely produced except by ingestion. Of the
k proteins, lactalbumin is the most important as an excitant.
ce heat destroys this fraction, boiled milk can be tolerated by
ny milk-sensitive individuals. Other milk-sensitive patients,
wever, must avoid all forms of milk and milk products, such as
ese, butter, buttermilk, cream, condensed, evaporated, powdered
l malted milks. Chocolate products often contain milk. Cream
ps, custards, ice-creams and varieties of candies often must be
ninated from the diet. In infants, milk substitutes as So-Bee,
goat's milk, fresh or canned, may be used.

MILK-POOR DIET

Avoid:

k, buttermilk, cream, as such, and in prepared foods, as ice cream, milk
herbet, custards, gravies, cream sauces, soups, chowders
pared flour mixes for home cooking
lted milk, hot chocolate or cocoa prepared with milk
ese
porated, powdered, condensed milk (bakery products, as pies, breads,
akes, containing small amounts of cooked milk can often be tolerated)
tter can usually be permitted

Fish and shellfish are notorious as causing violent urticaria, angioneurotic edema, asthma and acute gastro-intestinal attacks, although other clinical forms are found. In very sensitive cases severe symptoms can be produced by inhalation, as in the fish sensitive case previously mentioned.

SEAFOOD-FREE DIET

Avoid:

Fish and shellfish: fresh, canned, smoked, pickled; fish liver oils and concentrates in vitamin preparations

Fish and shellfish stews, bisques, broths, soups, salads, hors d'oeuvres, caviar, roe

Avoid licking labels, which often contain a fish glue adhesive.

Nuts are excitants chiefly by ingestion, causing severe coughing attacks, asthma and skin lesions. Some of the most violent and sudden attacks of asthma have been produced by members of this group, particularly almond, brazil nut, walnut and pecan. Cocoanut, hazel nut, pistachio and chestnut are less frequent offenders. Peanut is usually classed here, although it is a legume and more closely related to the peas, beans and lentils. There is a common factor present among the nuts, seeds and legumes so that sensitization may exist in nut sensitive cases also to mustard, beans, peas, cottonseed and flaxseed.

NUT-POOR DIET

Avoid:

Nuts of all types, also peanuts (a legume) and cottonseed meal in health and laxative breads

Nut crumbs on cookies, cake icings, ice cream

Candies containing nuts

Salad oils, lard substitutes, margarines made of cocoanut, cottonseed or peanut oils (many are so made -inquire of the grocer); olive oil permitted Individuals highly sensitive to nuts are often allergic to seeds, such as cottonseed flaxseed, mustard (by external application in poultices, as well as when ingested as foods), beans, peas. Legumes ,such as peas, beans, lentils, are often allergenic factors in the patient sensitive to nuts, but some patients tolerate legumes, such as peanuts, despite high degrees of nut sensitivity.

Chocolate and cocoa are frequent offenders, causing coryza, asthma and urticaria chiefly.

Meats, particularly pork, beef and fowl are occasional causes of clinical symptoms. As previously noted, egg-sensitive cases are frequently allergic in a lesser degree to fowl. It should be remembered that in pork-sensitive cases not only bacon, ham and sausage must be considered, but lard in foods prepared with this shortening.

Vegetables are infrequent causes of allergic reactions except for a small group including celery, onion, white potato, green pea and beans. Asthma, coryza, urticaria, angioneurotic edema and gastro-intestinal symptoms are among the clinical conditions described as developing, not only by ingestion, but by inhalation, as in the case of the celery-sensitive patient previously described, and by contact with the unbroken skin as in the case of those described

nsitive to potato peel. Dermatitis has been reported not only handling raw string beans and raw tomatoes, but also from act with the leaves and stems of the plants.

uits are generally of minor importance as allergic excitants, ugh clinical reactions to apple, pineapple, peach, pear, straw-, melons and the citrus fruits are fairly common. Orange is ably the fruit most frequently responsible for symptoms in ren and infants. As in the case of the vegetables, the attacks sthma, coryza, urticaria or angioneurotic edema, eczema and ro-intestinal upsets may occur from inhalation and contact with skin, as well as from ingestion. Frequently with vegetables, as to and tomato, as well as with fruits as apple, peach or pear, rind, skin or seeds may be the offender, the remainder of the table or fruit being harmless to the patient.

pices and the essential oils used as flavorings, such as oils of ergreen, spearmint, peppermint, sassafras, clove, etc., must be tioned. Mustard, black pepper and vanilla are important excit- in this group. Not only by ingestion but by cutaneous contact he form of plasters, mustard may be a disturbing factor. As iously mentioned, mustard sensitiveness is frequently asso- ed with sensitiveness to nuts and to seeds such as cottonseed flaxseed. These latter two substances must also be considered oods, since the former is used commonly as a salad oil and as a tening, and the latter as a laxative in some health breads and kfast foods. In cottonseed and flaxseed sensitive cases it has n claimed that the source of the excitant may be the milk from s fed upon these substances.

Vhen the patient becomes symptom free, the foods which have n banned may be added singly with at least three days between itions. A return of symptoms will usually implicate the latest ition. Unless successful by the end of three weeks, the restrict- should be abandoned. In this case a more rigid elimination edure is indicated.

emistarvation Diet.—This more drastic contraction of the diet* be indicated where the foregoing diets fail, or where the acute- of the patient's symptoms (as often in urticaria) demand mpt action. The patient is then placed upon a semistarvation as follows:

Days: 1-3	*Days: 4-5*	*Day: 6*	*Day: 7*
Boiled rice	Add:	Add:	Add:
Butter	Carrots	Beef or Lamb	Grapefruit
Weak Tea	Beets		Prunes
Cane Sugar	Lettuce		Pears
Salt			
Lemon			

he patient is not limited as to the amount of boiled rice he may The weak tea is limited to four cups daily and the remaining stances to a quantity sufficient to render the rice more acceptable. re is no limit to the amounts of the several other foods added ually. Ascorbic acid 1000 mg. daily should be given. If

*his diet has been described by me in "Office Immunology," Sulzberger and , Office Immunology, Year Book Publishers, Chicago, 1947.

improvement does not occur on the rice diet specified for the f three days, it may be supplanted by milk, butter, baked pot and salt, either at once or after an interval of expanded diet wh may be necessary due to the patient's weakened condition. At end of the seventh day other foods may be added cautiously, rese ing to the last the chief offending foods described previously su as milk, egg, chocolate, nuts and seafood. Each newly added it of diet should be followed by a three day period of observation. no symptoms appear, another item may be then added in the sa manner.

Food Diary.—To avoid confusion and uncertainty, a care record must be kept by meal, breakfast, lunch, dinner, of foo eaten together with a list of those eaten between meals. At t end of each day's entry, a note should be made of the severity an exact time of appearance of any symptoms for the preceding twent four hours. A relationship may thus be established between th foods ingested and the symptoms which have appeared.

The elimination diets of Rowe are based upon the trial and erro procedure, the patient being placed upon a severely restricted di until it is proven that it can or cannot be tolerated. If the symp toms disappear upon the menus elected, additional foods are cautiousl and slowly added one at a time. Successful results have bee obtained in many perplexing cases by this method, but it is ofte difficult to secure the complete coöperation of the patient due to th necessary rigidity of the plan.

A non-specific high-calcium diet is useful in hay fever and allergi coryza as an adjuvant to the specific hyposensitization procedures (Refer to page 478). Care must be taken before prescribing this diet to see that the patient is not susceptible to the foods indicated.

The addition of cod-liver oil concentrate to the diet renders it more effective. The tablets (two) may be administered three times a day. It is suggested that 2 teaspoonfuls of lactose be added to each glass of milk.

Refer elsewhere for additional Foods Highest in Calcium.

Offending-food-free Dietary.—The following arrangement of foods is of value as a permanent diet in cases of infective asthma, or asthmatic bronchitis where food is not a specific causative factor or as a temporary diet in other allergic conditions, to be used while the possibility of specific food excitants is being investigated. It will be noted that the substances found generally to be the most frequent excitants are omitted together with many of the foods most common in producing flatulence.

Omit.	**Advised.**
Egg and egg-containing foods	Butter, cream
Milk, unless boiled twenty minutes	Bacon
Cheese, ice-cream	Chicken, turkey
Pork, ham and sausage, fresh or smoked	Lamb (roast, chops, kidneys)
Fowl (duck, goose)	Beef (roast, steak, calves' liver, chipped beef)

Omit.		Advised.	
ish, except oysters		Oysters	
t and wheat products		Rye (pure rye bread, Ry-Krisp crackers)	
acaroni, noodles, spaghetti)		Rice (also Rice Flakes, Cream of Rice cereal)	
		Corn (cornmeal muffins, Corn Flakes, hominy)	
		Oats	Barley
		Arrowroot	Tapioca
ables:			
ans, all types	Green peas	Artichokes	Onion (boiled)
xcept string	Green pepper	Asparagus	Spinach
eans	Mustard	Beets	Squash
occoli	Onion (raw)	Carrots	String beans
ussels sprouts	Parsley	Eggplant	Tomato
bbage	Parsnip	Endive	White potato (baked)
uliflower	Radishes	Lettuce	
lery	Sweet potato	Okra	
cumber	Turnips		
ts:			
ntaloupe	Raisins	Apples	Lemon
trus fruits (in children)	Strawberries	Apricots	Limes
oneydew melon	Watermelon	Banana	Oranges
		Berries	Peaches
		Cherries	Pears
		Cranberries	Pineapple
		Dates	Plums
		Figs	Prunes
		Grapefruit	Rhubarb
		Grapes	Tangerines
rages:			
nocolate, cocoa		Tea	
eer, ale		Coffee	
rbonated drinks (ginger ale, etc.)		Coffee substitutes	
cellaneous:			
lad oils except pure olive oil		Olive oil	
ondiments, highly spiced foods		Gelatin	
ried foods			
xcessively sweet foods			
tensely cold foods or drinks			

hile the emphasis in this discussion is placed upon the diet, it t be borne in mind that not always is food responsible for the ptoms in the various allergic conditions. Very often the causa- factor is found to be either an inhalant or an acute or chronic ctive process, located usually in some portion of the respiratory astro-intestinal tract. Accordingly, such causes must be con- red in a search for the etiology in any allergic state.

OTE.—Further details referable to elimination diets are to be ined in the portion devoted to Dermatology and Exudative thesis.

Iigraine.—In the discussion of allergic diseases it was stated, in opening sentence, that certain forms of migraine were classified

as hypersensitive conditions. La Roche, Richet, and Saint Gir have suggested that headaches might be a form of allergy. T years later Brown stated that he had discovered that certain foo produced headaches in some individuals. Many other investigato have stated that migraine is an anaphylactic reaction. Wh undoubtedly many headaches of allergic origin seem to pres characteristics of migraine, there are many others which do not conform. For this reason it would seem best, as suggested b Eyermann, to classify cases of food headaches as allergic, and n as migraine.

The remarks made previously as to the foods most important excitants in the several types of allergic diseases apply here. has been estimated by some authors that at least one-third patients suffering from allergic headache respond with immediat specific reactions to tests with the various food excitants. However the majority do not respond, chiefly because they are of the delaye type, with a reaction time of from three to forty-eight hours intervening between the ingestion of the specifically exciting food an the appearance of the headache. It could hardly be expected tha a patient, in whom the symptoms of a headache occur after a lapse of several hours following the ingestion of the food, would respond with an immediate cutaneous reaction upon test. When the cause of the headache is not apparent by history or by test, and when elimination diets are unsuccessful, the offending food dietary mentioned previously may be tried.

Hay Fever.—Although true hay fever is always caused by contact with specific pollen excitants, many cases of pollinosis have found that their symptoms are greatly aggravated by dietary indiscretions. This form of irritation may be due either to an associated hypersensitiveness to foods or to a non-specific stimulating effect upon the congested upper respiratory mucosa. Many patients sensitive to ragweed pollen are found to be sensitive also to many summer fruits and vegetables, particularly sweet corn, cucumber, cantaloupe, honeydew melon, watermelon, peaches, pears, and grapes; less frequently radish, lettuce, and tomato are found to be excitants.

As mentioned previously, it must be remembered that every allergic case presents a different food problem, and where there is present in the history of the hay fever patient a suggestion of food sensitiveness, the reaction to the various articles of diet should be studied. A non-specific irritating effect frequently occurs from the ingestion of alcoholic beverages. Tobacco, particularly in the form of cigar smoke, coffee, and tea have been found to be intensely irritating to many hay fever patients.

ANEMIA, PERNICIOUS.

Discussion.—The dietary management of pernicious anemia is a problem which should interest equally the physician, the dietitian and the nurse. This disease has always presented so many obstacles to health, that any therapeutic advance must be regarded as a decided step forward.

rior to the work of Minot and Murphy, pernicious anemia was owly progressing disease which terminated fatally. Since the oduction of the liver diet, the profession accomplishes what etofore was impossible; namely, the restoration of the blood nt to normal and the maintenance of the health of the patient. lthough still ignorant of the etiology of pernicious anemia, the fession is fully acquainted with its manifestations. It is familiar only with the blood picture and its variations, but also with various changes exhibited throughout the body.

Iany investigators, who have conscientiously followed cases of nicious anemia by frequent blood counts while administering a r diet, have definitely substantiated the findings of the original ervers.

'ery promptly after the introduction of a liver diet, the change erved in the blood count, of increased red cells and hemoglobin, ether with a change in the character of the red cells themselves, pparent. Not long after the institution of a proper diet the od count loses its characteristic pernicious anemia picture and quently simulates a secondary anemia.

No better presentation can be given of the method of treatment n a paraphrasing of Minot and Murphy's original work.

The daily requirements of the diet in order of their importance are:

. Liver (calves', beef or chicken), and lamb kidneys freshly ked. At least 120, preferably 200 or more grams (cooked weight); k without fat; broil, bake, boil, mince or make into soup.

2. Fruits (preferably fresh), especially peaches, apricots, pine-ple, strawberries, oranges and grapefruit—about 400 grams.

3. Red muscle meat, trimmed free of fat, freshly cooked; 125 ms or more. Beef heart desirable.

4. Vegetables containing 1 to 10 per cent carbohydrates, prefer-ly fresh, raw or cooked; not less than 300 grams. Lettuce, le, asparagus, cabbage and tomatoes, especially desired. (Refer table of carbohydrate content of vegetables.)

5. Fats restricted, not over 70 grams. Avoid cheese, bacon, fried ods. Allow but little cream and butter and not over 1 egg daily. e mineral oil for salad dressings.

6. Avoid grossly sweet food; allow sugar sparingly.

7. Starchy foods, as cereals, potatoes, breads, add to suit indi-lual's desires, but not to the exclusion of requirements previously ted. Starchy foods, such as crusty or dextrinated whole wheat ast are desirable.

8. Milk should be limited to 240 cc. daily.

9. Avoid excess salt.

0. Tea and coffee as desired.

From the preceding outline it is seen that the diet is high in oteins, purins and iron, and low in fats. Particular stress should laid upon the attractiveness of the service. Minot and Murphy vise the serving of several small meals each day rather than ree average meals. The likes and dislikes of the patient should considered but the obligatory articles must be eaten. This will quire extra effort if palatability is to be assured.

Typical Menu.

Breakfast:
- Fruit
- Cooked whole grain cereal with milk *or* whole grain toast wi butter
- Egg *or* liver *or* kidney
- Milk *or* coffee with milk and sugar

Luncheon and dinner:
- Liver *or* kidney *or* lean meat
- Cooked vegetable, other than potato, with butter
- Salad with lemon juice
- Whole grain bread with butter
- Fresh *or* stewed fruit
- Milk *or* coffee *or* tea with milk and sugar

Suggestions.—In persistent diarrhea it may be necessary to redu the fruits and to purée the vegetables.

When it is impossible for the patient to take much food, it i important that at least some liver or kidneys be eaten. The starc foods are given in accordance with the amount of other food partaken. Present information suggests that the patient shoul continue this type of diet even though the red blood cell coun remains high.

The efficiency of such a diet as has just been described is dependent in a direct ratio on the lack of cooking that the liver undergoes. It is therefore advantageous to cook the liver as little as possible, providing it is palatable.

Where raw liver is included in the menu, it may be finely ground and served with tomato juice in the form of a cocktail or added to soup just before serving.

When patients are intractable and do not coöperate, when an idiosyncrasy is present or when the expected response to liver therapy is disappointing, the administration of a well recognized liver extract or other hematopoietic is indicated.

Loss of weight in pernicious anemia is characteristically uncommon. This should be considered in the computation of a proper dietary as it is rarely necessary to institute a high-caloric diet. Infiltration into the diet of those foods highest in manganese, copper and iron in the form of coarse vegetables and fruits can well serve to establish the proper indicated mineral and caloric intake. Refer to Foods Highest in Manganese, Copper and Iron.

Spontaneous cures of pernicious anemia have been reported. Further observation of these spontaneously cured cases has yielded evidence of characteristic remission periods of unbelievable length.

As previously mentioned, the feeding of liver and other foods high in protein will produce prompt response with blood regeneration in almost all cases of pernicious anemia. The actual curative factor in "liver therapy" has not as yet been determined. It is possible that this effective factor alone is insufficient to produce the accomplished result. Whether there is some synergistic asso-

n between this unknown and other elements as amino-acids, calcium, copper, manganese, etc., remains to be seen.

espective of the pleasing laboratory and clinical results recorded "liver therapy," the restoration of spinal cord changes to al has not yet been observed.

is generally expected that a patient suffering from pernicious ia will present a lowering of the gastric acid content even achylia gastrica. Aside from diet this can be corrected by dministration of various therapeutic agents. Generally, the ration into the diet of those foods recommended elsewhere r Gastric Hypoacidity will prove beneficial.

lditional supplies of the vitamin-B complex are desirable. This ost effectively taken as the powdered brewers' yeast. If pos-, at least 1 heaping T. should be taken in water or tomato juice to meals. Large doses (1 to 2 grams per kilogram of body ht) have been associated with marked improvement in perni- anemia.

ANEMIA, SECONDARY.

iscussion.—Secondary anemia is an anemia associated with some onstrable cause such as hemorrhage, nephritis, diabetes, heart ase, syphilis, malaria, etc.

he anemia encountered in childhood is generally nutritional and ronmental in origin. Proper checking of the diet with investi-on of the vitamin and mineral constituents as against the nor- requirements will often indicate the sole corrective course. osure to sunlight or artificial heliotherapy, in conjunction with administration of the hematopoietic stimulating foods, will erally bring about desired results in the event that there is no ding focus present.

he paramount considerations in the dietary treatment of secon- anemia which have proved valuable are: the intake of suffi-t caloric value to meet the requirements of the individual; the ition to the diet, with major insistence, of certain proved foods; the replenishment of lost fluid volume when indicated.

he treatment of anemia during the past several years has under-e marked metamorphosis due to the epochal work of Minot and rphy. Whereas the efficiency of liver in secondary anemia is that shown in pernicious anemia, nevertheless its administra- is an important factor in establishing blood regeneration.

ollowing is a table of Foods Most Capable of Increasing Hemo-in:

aragus	Brains	Molasses
les	Calves' liver	Peaches
icots	Chicken gizzard	Pig kidney
f heart	Chicken liver	Pineapple
f kidney	Fish liver	Prunes
f liver	Lamb kidney	Raisins
f spleen	Lamb liver	Strawberries
e-marrow	Lettuce, green	Yeast

Modern diets will be at variance with past teachings. Ma
the profession's pet theories of foods for anemia have been disca

The effect of the ingestion of iron as obtained from foo
thought to be synergistically enhanced by the associated pre
of copper and manganese. The following foods carry the hi
combination of these three minerals:

Almonds	Cocoa	Pineapple
Beans, kidney	Filberts	Pistachio nut
Beans, lima	Lentils	Spinach
Beef juice	Liver, calves'	Walnuts
Cherries, fresh	Olives, green	Watercress
Chocolate	Parsley	Wheat bran

The necessity of sufficient *vitamin A* in the correction of ane
has been widely stressed. A predominance of this vitamin is fo
in the following foods: butter, fish-liver oils, tomato, egg-yo
milk and leafy vegetables, principally cabbage, cauliflower, lett
and spinach.

Generous amounts of the vitamin-B complex should be furnish
in the diet. Brewers' yeast is particularly desirable. It may
taken on arising in the morning.

The maintenance at a high level of the *protein* element in th
diet is also essential. An effort should be made to introduce pro
tein-bearing food wherever possible, which may be convenientl
accomplished by combining the two lists of previously recommende
foods.

A properly balanced diet should be a palatable mixture of th
indicated foods, containing sufficient caloric value to satisfy the bod
requirements. Molasses should be introduced wherever feasibl
since it is highly efficacious in the treatment of nutritional anemia

Omit.

Fried foods
Highly seasoned foods
Rich desserts

Limit.

Condiments and seasonings, aside from an amount of peppe
and salt requisite for palatability.

Typical Menu.

Breakfast:

Fruit
Whole grain cereal, cooked *or* prepared, with milk and sugar
Egg, except fried
Whole grain toast *or* rolls with butter
Milk *or* coffee with cream and sugar

Typical Menu.—(*Continued.*)

uncheon:

Choice: meat, fish, eggs *or* cheese
Cooked vegetable
Salad with dressing
Whole grain bread *or* roll with butter
Fresh *or* stewed fruit
Milk *or* tea with lemon and sugar

inner:

Soup
Meat *or* fish
Potato
Cooked vegetable
Salad with dressing
Whole grain bread with butter
Choice: fruit, simple dessert, cheese and crackers
Milk *or* coffee with cream and sugar

Suggestions.—Frequently, in conjunction with anemia, there is esent an anorexia, causing the volume of food consumed in enty-four hours to be inadequate. In these cases it is wise to strict those foods low in caloric value and replace with foods of eater caloric yield.

An increased volume of food per diem is further accomplished restriction of fluids, particularly water, at meal times and its ministration between meals. It is essential that the caloric-elding foods are not replaced by non-caloric-bearing liquids. In emias with associated digestive disturbances, nutritional value ould be sacrificed for digestibility.

Although there is some dispute as to the efficacy of liver in the eatment of secondary anemia, nevertheless, in view of the high-loric value obtainable from liver, its prescription is not contra-dicated.

Often in the treatment of anemia there are associated conditions hich may be so offending as to make the prescription of a detailed et impractical. However, the adherence to the general principles tlined should be observed.

It is important to remember that the administration of broths, uillon and beef extracts, so long recommended in anemias, is luable only in so far as they tend to stimulate a jaded appetite d afford a source of readily assimilable mineral salts.

Commonly, the appearance of food in bulk, to an invalid, is appetizing, which makes it wise to serve the patient with two nall portions of the same food rather than one large serving.

For those patients who are underweight, a desirable adjuvant in e diet is olive oil which is advised after meals and which should

be served cold, flavored with some lemon juice, if necessary. C liver oil, due to its high-caloric value and vitamin potency, may be utilized. Refer to Chlorosis.

ANGINA PECTORIS

ROBERT MCGRATH, M. D.

One of the most important therapeutic measures in angina p toris is the maintenance of normal or slightly subnormal weight a the reduction of weight to these levels in the overweight pati Weight reduction can be obtained by using an 800 to 1000 cal diet. When the proper weight has been reached it can be ma tained by increasing the caloric intake to suit the individual patie

Hypertention is frequently associated with angina pecto Reduction of the blood pressure benefits the heart and often dim ishes the frequency of the pain. Recently a rice diet for hyp tension has been introduced which should be considered in ea case having angina pectoris and hypertension. (See diet in Hyp tension, page 257).

The remainder of the dietary measures for angina pectoris a concerned with the digestive tract. The patient sometimes do better on five small meals a day rather than the usual three. An food known to produce indigestion in the individual case should b omitted. The diet should be planned for the treatment of an associated disease or dysfunction of the biliary tract and the gastro intestinal tract such as chronic cholecystitis, biliary dyskinesia peptic ulcer, and functional disorders of the stomach and colon o which the common forms are hyperacidity, spastic colon, and atonic constipation. The great importance of proper diet in these asso- ciated conditions lies in the production of vasoconstriction of the coronary arteries by viscero-cardiac reflexes of which the efferent limb is the vagus. Years ago von Bergman showed that there is a great reduction in coronary flow in experimental animals when the stomach or the esophagus is distended by means of a balloon. This work was recently repeated by N. C. Gilbert and his associates with the same results and they also showed that coronary vaso- constriction resulted from distention of the gallbladder and from distention of the abdominal cavity with air. Section of the vagus nerves or atropine in adequate dosage prevented these viscero- cardiac reflexes in the animals. Gilbert and his associates also carried out clinical experiments in patients known to develop angina pectoris after meals. When a low oxygen mixture was administered it was demonstrated that the pain came on much sooner after a meal than before and that the effect of a meal did not develop if an adequate dose of atropine was previously given. These experiments show the effect of atropine in the prevention of viscero-cardiac reflexes and support the clinical impression of the value of proper diet in angina pectoris associated with conditions capable of producing such reflexes.

The actual dietary measures covering the points discussed will e found in this book under the specific headings such as weight eduction, hypertension, etc. Moderate use of coffee and tea may e permitted if the patient notices no unfavorable effect.

This discussion also applies to coronary sclerosis without anginal ain.

ARTHRITIS AND OTHER RHEUMATIC DISORDERS

Edward V. Hartung, M. D.

Any discussion of diet in arthritis and other rheumatic conditions ust take into consideration the various types of disorders under ese headings. For this reason we will briefly state the class-cation current today. One can divide the conditions into two oups, diseases of the joints, and diseases of the non-articular or brous, or supporting tissues of the body.

A modified classification of the disease of the joints is as follows:

(1) Infectional arthritis (of proved etiology, such as gonorrheal arthritis).
(2) Probably infectional (etiology unproved).
  a. Arthritis of rheumatic fever
  b. Rheumatoid arthritis
  c. Arthritis associated with various infections (as mumps, etc.)
(3) Degenerative arthritis. (osteoarthritis).
(4) Arthritis associated with metabolic disturbances (as gout).
(5) Arthritis of neuropathic origin.
(6) Miscellaneous forms (as serum sickness, hemophilia, etc.).

In addition, particularly for reasons of differential diagnosis, ther joint disturbances must be considered in this field, such as isturbances secondary to trauma either static or dynamic, disrbances secondary to lesions of the bones, primary neoplasms joints, and disturbances associated with loose bodies and second-ry to functional or psychogenic causes.

Disorders of the supporting structures of the body or "fibrotis" may be classified as follows:

(1) Anatomical classification
  Collagen degeneration
  Myosynovitis
  Fascitis
  Tendonitis
  Tendosynovitis
  Periarthritis
  Panniculitis
  Neurosynovitis
  Bursitis
(2) Etiological classification
  Infectional
    Acute (as in grippe)
    Chronic (as from focal infection)
  Probably infectional, as in
    Acute rheumatic fever
    Pheumatoid arthritis
    Lupus erythematosis
    Scleroderma

- Dermatomyoscitis
- Periarteritis Nodosa

Traumatic
- Dynamic
- Static traumatic (poor body mechanics)

Secondary (to abnormal use of joint)
- Under-activity
- Over-activity
- Architectural stress

Senile

Psychogenic

Metabolic

In most of these conditions diet has never been shown to be important consideration. However, where diet has been discussed as a factor in therapy, separate treatment will be given to each below. But before proceeding to a specific study of the dietary treatment of particular forms of rheumatism, it would be well to discuss separately the various food components, as they relate to rheumatic disturbances.

In recent years a great deal of work has appeared on the relationship of the various vitamins to rheumatic disorders. Few, if any, of these suggestions have a real basis in scientific observation. Vitamin A has been recommended in infectional processes in general and, therefore, in rheumatic disturbances where an infectional etiology has been proposed. In rheumatic conditions, however, a specific deficiency of vitamin A has never been proven, and the administration of vitamin A in small or large doses has never been shown to be effective in therapy.[11]

Vitamin B1 has a definite place where its deficiency has resulted in neuritic degeneration as in alcoholic polyneuritis, and for this reason, illogically, vitamin B1 has been used in the treatment of all forms of neuritis. It has been shown, however, that in most forms of neuritis usually included in the rheumatic fields, the cause is extrinsic nerve pressure, such as results from a herniation of the nucleus pulposus. In none of these conditions, naturally, will the administration of vitamin B1 be effective. One can say in general that the use of vitamin B1 in rheumatic neuritis is irrational and without therapeutic effect.[8]

Other components of the vitamin B complex have been recommended in this field for their general tonic effect and for specific effects on the gastro-intestinal function.[7] These are legitimate uses in the treatment of the constitutional status of the patient, but should never be considered as specific forms of therapy related to the etiological basis of the rheumatic disease.

A great deal of work has been done on vitamin C in this field. It has been shown, for example, that there is a deficiency of vitamin C in the blood and urine in acute rheumatic fever as well as in rheumatoid arthritis, and some workers have suggested that this might be an etiological factor in the causation of these conditions.[illegible] It is well known, however, that most infections are associated with similar findings of vitamin C deficiency, and that these findings

e manifestations of infection in general and not specifically of ieumatic disorders. However, the finding is an indication for ie administration of adequate amounts of vitamin C by mouth meet this proven deficiency.

Vitamin D has been used extensively in recent years in the treatent of rheumatoid arthritis, following the reports of Dryer and eed[4], and later Farley and his associates.[6] Its use has been populared by extensive advertising of a number of proprietary preparations, most of which contain 50,000 units of Vitamin D to each ipsule. While some of the reports on the use of these preparations rheumatoid arthritis, and also in osteoarthritis, appear favorable, ie best work has shown that their administration results at times a feeling of well-being, but in no sense affects the course or the athology of any rheumatic disease.[9] Vitamin D in ordinary nounts may promote intestinal absorption of calcium and phosiorus and for this reason is commonly recommended in small nounts as in cod liver oil. It must be stressed, however, that cessive vitamin D intake often produces nausea, vomiting, and gh calcium blood levels.[3] Deaths have been reported.

Vitamin E in the form of wheat germ oil or alpha tocopherol has en used in the treatment of primary fibrositis and Dupuytren's ntractures, particularly after the publication of articles by Steinrg.[17] Its use has been suggested on the basis of the muscle anges associated with known vitamin E deficiency.[13] However, hile favorable results in the treatment of fibrositis have been aimed following oral and parenteral administration and by the unction of vitamin E ointment, the general impression is that its e in fibrositic conditions is ineffective.

Vitamin K has recently been suggested for administration along ith sodium salicylate. It has been shown that large doses of dium salicylate may tempororily lower the prothrombin levels d that hemorrhagic manifestations may result. As a matter of ct it has been suggested that many of the hemorrhagic manistations formerly considered to be a part of acute rheumatic fever ay now be considered to be the result of therapy with large doses salicylates, rather than the result of the disease process itself. counteract this effect vitamin K has been suggested for adminration along with salicylates and its use has been shown to be ective in this regard. In no sense, however, has it been claimed be a factor in the treatment of the basic disease process.

The various mineral components of the diet have occasionally tracted the interest of rheumatologists. The foremost of these iron. In many rheumatic conditions notably acute rheumatic ver and rheumatoid arthritis the patient usually develops a pochromic anemia. It will be natural in situations of this type recommend the administration of iron (and liver) in large doses. owever, it has been repeatedly shown that its use in these cases es not produce effective results, in raising the hemoglobin or red ood cell levels. These rise automatically as the disease process comes quiescent. However, there is certainly no theoretical

reason why iron should not be administered as an adjuvant tre ment of the rheumatic disorders, particularly those of infecti origin.

Calcium by mouth and by parenteral administration has had proponents, probably because of the observation of decalcificat in infectional arthritis, particularly rheumatoid arthritis. In v of the fact that most work has shown that the serum calcium a phosphate levels in all ordinary rheumatic disorders are wit normal limits, and that calcium balance studies have always sho a relatively normal calcium and phosphate metabolism[16], it is di cult to defend the administration of either calcium or phospho in any of the rheumatic disorders. On the other hand, because the fact that in osteoarthritis one sees hypertrophic spurs at t joint margins, it has often been suggested that calcium is det mental. One must always remember that these spurs are n deposits, but rather extensions of the bone structure, and are alwa the result of bone irritation sequential to cartilage erosion and a not related directly or indirectly to calcium metabolic disturbanc or to calcium or phosphorus insufficiency or excess. Prohibitic against high calcium foods such as milk, therefore, has no ration basis in practice.

A low sodium high potassium diet has been recommended in th past by many physicians[14] on the assumption that this regime woul eliminate fluid from the joints; raw food diets[5] have been recom mended for this reason. This observation has not been scientificall verified.

In taking up the dietary indications for various forms of arthritis reference can be made to the classification outlined above. In infectional arthritis such as gonorrheal, streptococcal or pneu mococcal arthritis, the dietary indications are in no sense specific and depend on the basic disease and on the presence or absence o febrile reaction. Joint tuberculosis, which by the way, is an increas ingly rare disease, naturally requires a dietary high in caloric and vitamin intake, just as does other forms of tuberculosis.

In acute rheumatic fever there are no special indications excep as indicated by the severity and stage of the disease. Naturally during the acute stages with temperature the dietary must be suitable for such patients. A diet, high in vitamin C with supple mental vitamin C intake by mouth, is indicated on the basis of th low vitamin C levels found in this disease.[15]

There is a general and probably well-founded impression tha acute rheumatic fever is more common among the poor than th well-to-do.[12] This has been shown by many workers. Peete found that rheumatic fever was less prominent in private school pupil than in students in public schools, and less prominent in rural tha in city populations. The importance of vitamin A and B, milk proteins, and sunshine, and the importance of plenty of rest, lack of crowding in housing, and freedom from emotional stress hav all been factors emphasized in the past, and probably with con siderable justification.

Rheumatoid arthritis has received a great deal of attention [fro]m the dietary point of view in the past years, but recently it [ha]s been realized that there are no specific indications of a dietary [na]ture in this crippling disorder.[2] Almost all patients with severe [rh]eumatoid arthritis lose weight markedly and develop a hypo[ch]romic anemia. It is considered, however, that malnutrition is [de]finitely not a cause of the disease. Contrary to the impression [ga]thered in regard to acute rheumatic fever, it is well-established [th]at rheumatoid arthritis attacks the rich and poor equally, the [we]ll-nourished as well as the poorly fed. It is definitely known [th]at the loss of weight and the anemia are related to the basic [m]echanism of the disease and are not specifically dietary.

Most of the restrictions considered important in the past have [be]en left behind. These restrictions at one time or another covered [mo]st food components of the normal diet. It was considered that [me]at was bad because it was "too acid". In part this was due to [a c]onfusion of this disease with gout. Carbohydrates have been [co]nsidered detrimental because of an alleged impaired glucose tol[era]nce. A reduction in the caloric intake appears to benefit the [di]sease according to some workers. Specific dietary factors have [be]en accused of detrimental effects, such as tomatoes, citrous [fru]its, asparagus, etc. Needless to say, none of these restrictions [ha]s been found to be based on unassailable scientific evidence.

A patient with rheumatoid arthritis should receive specific in[str]uctions, so that he may partake daily of a well balanced high [cal]oric diet, adequate in iron, calcium, phosphorus and vitamins, [su]pplemented for safety sake by vitamin concentrates, particularly [B] Complex, C and D_1. Such a diet is outlined on page 48.*

The patient should be impressed with the fact that an adequate [am]ount of protein intake is essential, not only because of the anemia, [bu]t also because of the fact that in severe rheumatoid arthritis one [co]mmonly finds a low albumin content of the plasma, the albumin-[glo]bulin ratio being commonly reversed, causing pendent edema. [Th]is finding is not related to renal insufficiency but is probably [ba]sed on some change in liver, or possibly adrenal cortex, function.

In summary let us say that it is essential to impress the rheu[ma]toid arthritis patient with the fact that there are no important [die]tary prohibitions. Even alcohol in ordinary amounts is allowed.

Degenerative arthritis or, to use the common term, osteoarthritis, [is] a wearing out of the joint structures, particularly the cartilage, [du]e to prolonged or abnormal use. In a sense it is not a disease at [all] but rather a manifestation of aging. Dietary conidserations [ha]ve been stressed as important factors in the cause of this basic [car]tilage erosion. It is true that cartilage, along with the hair and [nai]ls, is high in sulphur content, and in the past sulphur has been [adm]inistered by mouth and parenterally because of this fact. How[eve]r, the sulphur metabolism of cartilage is an almost unknown [sub]ject, and in addition the administration of sulphur to date has [nev]er been shown to be effective in the prevention or therapy of this [dis]order.

* Any well-balanced high vitamin diet outlined in some other part of the text.

All people over forty have more or less osteoarthritis, depend on the worth of their cartilaginous tissues and the amount of to which they have been applied in their lives. Everyone, howev does not complain of symptoms. The usual precipitating fa productive of symtoms is trauma and the most important trau is static trauma. Foremost in this latter regard is the rôle of obe in producing static trauma on already degenerating joints. T basic cartilaginous damage in osteoarthritis cannot of course corrected, but the traumatic factors sequential to poor body mech ics, particularly obesity, are decidedly susceptible to proper thera

Most people complaining of osteoarthritic joints will be fou to be overweight. Therefore, one of the first principles in t treatment of osteoarthritis is a reduction in weight where the weig is found to be excessive. This simple procedure is often the dec ing factor in the elimination of pain in osteoarthritic joints. Th usual 1000 or 600 calorie diet, depending on the severity of th obesity, is recommended (see pages 467, 468).

Gout is the one disease producing joint manifestations whic appear to demand specific dietary therapy. The etiology of go is still unknown and some workers even question whether or n a defect in urate metabolism is the basic derangement. It is cer tainly a fact that the endogenous production of urates is mor important than the urates of exogenous origin. However, it i equally true that diets excessive in uric-acid-producing foods ar detrimental and can be shown to precipitate attacks.

During an acute attack of gout experience indicates that a die extremely low in purine substances is beneficial. A diet which is purine free is not considered practical. During an attack, there- fore, it has been found effective to allow the patient to have carbo- hydrates and sugars, all the fruits and vegetables, all the cereals and protein in the form of eggs, milk and cheese, but the latter in small amounts only, because of their high fat content.

Between attacks and in chronic gout it is sufficient to restrict the dietary to the above items and in addition allow one small portion of meat, fish or fowl each day.

The time honored custom of handing the patient with gout a list of foods, high, medium, and low in purine content, and allowing him to make his selection from this, does not appear to have pract- ical value. The foods highest in purine contents, however, such as the inner organs of animals, are never allowed in the dietary of a gouty patient.

A ketogenic diet has been shown to result in an elevation of the blood uric acid level.[10] This can be demonstrated during the admin- istration of a low caloric diet in the reduction of obese patients, or in the administration of a high fat diet in any patient, with or with- out gout. Because of this it is now considered important in gout to restrict the intake of fat to a minimum compatible with health and proper intake of fat-soluble vitamins.

Vitamin B Complex has occasionally been considered a factor in the etiology and therapy of gout and its administration has been

mmended as a therapeutic measure. However there is prob-
no basis in scientific fact for this usage.

BIBLIOGRAPHY

R, W.: Jour. Am. Med. Assn., **104**, 1, 1935.
ES, T. B., RICHARDSON, H., and HALL, F. C.: New England Jour. Med., 29, 319, 1943. SHORT, C. L. and BAUER, W.: New England Jour. Med., 27, 442, 1942.
N, A.: Internat. Clin., **3**, 287, 1937.
ER, I. and REED, C. I. L ARCH. Phys. Ther., **16**, 537, 1935. Questions nd Answers: Jour. Am. Med. Assn., **118**, 493, 1942.
NGER, H.: Ztschr, f. arztl. Fortbild, **36**, 672, 709, 1939.
EY, R. T.: Jour. Am. Inst. Homeop., **31**, 405, 1938. FARLEY, R. T.: PIERLING, H. F., and KRAINES, S. H.: Industr. Med., **10**, 341, 1941.
CHER, A. A.: Bull. Acad. Med. Toronto, **9**, 272, 1936. HOLBROOK, W. P., nd HILL, D. F.: Jour. Am. Med. Assn., **174**, 34, 1936. FLETCHER, A. A.: our. Lab. and Clin. Med., **15**, 1140, 1930.
BERG, R. H.: Jour. Am. Med. Assn., **119**, 1165, 1942.
BROOK, W. P., and HILL, D. F.: Jour. Am. Med. Assn., **107**, 34, 1936.
YATT, B. L., HICKS, R. A., and THOMPSON, H. E.: Ann. Int. Med., **10**, 34, 1936. FARLEY, R. T.: Illinois Med. Jour., **71**, 74, 1937. BOOTS, R. H. our. Am. Med. Assn., **123**, 857, 1943.
IE, L. M.: Ann. Int. Med., **13**, 755, 1039. LOCKIE, L. M.: Clinics, 57, 1942.
ROE, R. T.: Chronic Arthritis, in Oxford Loose-Leaf Medicine, New , Oxford Univ. Press, Chap. 15, p. 367, 1939. HALL, M. G., BAYLES, . B., and SOUTTER, P.: New England Journal. Med. **223**, 92, 1940.
RIS, J. N., and TITMUSS, R. M.: Lancet, **243**, 59, 1942.
ENHEIMER, A. E.: Jour. Mt. Sinai Hosp., **7**, 65, 1940.
ER, L.: Am. Jour. Med. Sci., **206**, 498, 1943.
HART, J. F.: Internat. Clin. **2**, 22, 1937.
——Ann. Int. Med., **9**, 671, 1935.
——Lab. and Clin. Med., **21**, 597, 1936.
——Arch. Int. Med. **61**, 552, 1948
——Arch. Int. Med., **6**, 537, 1938.
HART, J. F., CONNORS, C. L., and METTIER, S. R.: Jour. Exper. Med., **59**, 97, 1934.
HART, J. F., GREENBERG, L. D., and BAKER, F.: Proc. Soc. Exp. Biol., nd Med., **35**, 347, 1936.
HART, J. F., GREENBERG, L. D., and CHRISTIE, A.: Proc. Soc. Exp. Biol., and Med., **35**, 350, 1936.
HART, et. al.: Arch. Int. Med., **61**, 552, 1948.
S, M. W., ROSSMEISL, E. C., and BAUER, W.: Jour. Clin. Invest., **22**, 85, 1943.
NBERG, C. L.: Am. Jour. Med. Sci.. **201** 347 1941.

ANHYDREMIA

VINCENT LARKIN, M.D.

iscussion.—When, for any reason, the amount of water eliminated omes greater than the amount ingested, desiccation of the blood tissues results, and characteristic symptoms become mani- attributable to blood concentration. The most common e of anhydremia is diarrhea in which the stools are copious, uent and watery. Vomiting is usually an associated symptom, the fluid intake is grossly diminished. Increasing the amount ood in such cases causes an increase in the severity of the symp-

toms, and therefore, the clinical picture has been errone assumed to be one of alimentary intoxication. It is comm recognized that the severe symptoms of alimentary intoxic are due to the loss of water with consequent anhydremia, ra than to the absorption of toxic materials.

Anhydremia is also found in the absence of diarrhea, and when the food is of such a character that it does not cause ga intestinal disturbances. An example of this is seen in infants have been nursing from dry breasts. It is seen in starving pati and in idiots who refuse food and water. It occurs with intracra lesions which cause central vomiting, and during the course of cer acute infections like pneumonia and influenza.

The symptoms are dependent to a great extent upon the decrea blood volume. One of the earliest symptoms is a loss of body we which is often excessive in amount and rapidity. Coincidental w this the appearance of the patient changes. The features bec sharpened and the eyes sink deeper, turn upward, become gla and have a far away stare. Later, the luster of the conjunctiva lost and they are coated with a film. The skin becomes dry, assum a peculiar pallor, and the fontanelle is depressed. The mouth open, the tongue is dry and furry and the lips parched and crack and frequently of a dark red color.

The pulse is small and irregular and the volume flow of the blo is greatly diminished, due to its concentration. Frequently a modera leukocytosis is present.

The urine is scanty and highly concentrated conta ininggranul casts and albumin. The kidney becomes functionally inacti although at postmortem examination no demonstrable lesions a evident This renal inactivity leads to the accumulation in th blood of products ordinarily readily eliminated.

The non-protein nitrogen of the blood rises. Amounts abo 200 milligrams per 100 cc. are not uncommon. The blood chlorid are increased. The blood bicarbonate content is reduced. In som cases this is so low that the volume percentage of CO_2 falls belo 10, thereby indicating a reduction of bicarbonate to one-fifth the normal.

As a rule, there is some fever present. This may be due to infe tion, but at times seems to be due to a disturbance of the cerebr heat regulating center. At first these patients are excited an restless, but later, if untreated, they lapse into coma and final convulsions appear.

The progress depends to a great extent upon the underlyi causes. In vomiting and diarrhea the prognosis is serious. Acidos renders the prognosis especially grave, as it indicates that there h been a profound metabolic disturbance. If the anhydremia is d to insufficient fluid intake alone, it usually clears up prompt when sufficient fluid has been given.

Prophylactic Treatment.—Treat promptly any condition which likely to lead to water loss by increasing the fluid intake. Rememb that the water balance must remain positive. Treat the diarrh as outlined elsewhere. Give water freely.

eatment. —Once the condition is well developed, the essential
g to do is to supply water. This may be given by mouth, as
uently as possible and as much as the child will take. If vomited,
ediately offer it again and it will often be retained. Saline
tions intravenously, subcutaneously and intraperitoneally may
indicated.

n severe cases it is advisable to give dextrose intravenously
to 15 per cent solution). This is hypertonic, but the dextrose is
apidly oxidized or stored that the injection of such a solution is
ost equivalent to the injection of water. These injections may be
l two or three times daily to increase the blood volume and im-
ve the circulation. At the same time the glucose acts as a
etic and supplies a certain amount of food value. Blood trans-
ons also help restore the blood volume.

ARSENIC POISONING.

Refer to page 492.

ARTERIOSCLEROSIS.

iscussion.—In spite of the tremendous amount of energy ex-
ded in the past and still being devoted to the study of arterio-
rosis, the disease, at this writing, is of unknown etiology. The
hologic findings clearly indicate that the original vascular change
f a fatty nature. Animal experimentation has produced changes
he arterial vessels, comparable to arteriosclerosis in the human,
the maintenance of high-protein diets. Irrespective of this
ellent experimental work, the consensus of opinion does not
ce the blame specifically on protein. The rôle of cholesterol
not be completely ignored.

t is accepted that arteriosclerosis predominates in the elderly
startling exceptions to the rule are occasionally observed.
cently the author examined an eighteen-year-old Irish boy, in
om arteriosclerotic infiltration in the peripheral vessels was so
ere as to cause the radial arteries to simulate small tendons.

he dietetic treatment of arteriosclerosis should be directed
ard associated clinical entities such as hypertension or renal
olvement. For overweight patients, already burdened with
eriosclerosis, a reduction diet should be immediately instituted,
a reduction of weight will relieve the cardiovascular system of
unnecessary overload. The diet and regimen instituted for
rial hypertension is particularly suitable for the arteriosclerotic.
n reiteration, maintenance of a proper caloric intake, volumetric
inution of the meals, avoidance of those foods tending to
duce flatulence, together with an abundance of green vegetables
l a moderate amount of meat and fish, should prove efficacious.
e maintenance of a daily protein intake of at least 60 to 80 grams
uld be observed.

he question of salt restriction is still debatable. In all cases of
pertension, arteriosclerosis, nephritis, obesity and in many other
ditions, salt should be restricted. One phase of reasoning for

this decision is that salt and other seasonings tend to increase appetite and thirst, resulting in the overingestion of food or liqu

Specific diets for any associated disease may be found in de in the portion of the book relegated to that disease.

BERI–BERI.

(See Section of Vitamin B_1, p. 816)

BRIGHT'S DISEASE.

HERMAN O. MOSENTHAL, M.D., AND MAURICE BRUGER, M.D

Discussion.—Bright's disease is not an entity which may be tra from an etiologic agent that injures one organ from which t symptoms and signs spread out in a simple figure, like the spok from the hub of a wheel. That is what the advocates of the clas fication of Bright's disease, on the basis of the pathologic lesio within the kidney, would have us believe. Such a conception nephritis is perfect from the point of view of the pathologist, b does not meet the needs of the practising physician. For the latte Bright's disease is made up of a number of disturbances in the rea of anatomical or functional pathology or both, that, because of th vision of Richard Bright, have been grouped under his name. It more satisfactory for the clinician to analyze each case as a sympton complex and thus develop a diagnostic picture which he can handl more intelligently and more effectively than if he classed eac patient as acute diffuse glomerular nephritis, arteriosclerotic nephri tis, or any other form of non-suppurative, inflammatory, rena lesion.

The problems in anatomic and functional pathology which shoul be considered in any case of Bright's disease are six in number Not all of them are present in every patient and when they ar found, one or the other assumes a dominant rôle and should be given corresponding attention. These six problems in Bright's disease are

1. Pathology of the kidney (that is, nephritis) and other organs
2. Diminution of renal function.
3. Arterial hypertension.
4. Edema.
5. Anemia.
6. Uremia.

Classification of the Renal Lesions in Bright's Disease (Nephritis)

I. **Glomerular Nephritis** (primary involvement of the glomeruli inflammatory nephritis, hemorrhagic nephritis).

A. **Diffuse glomerular nephritis.**

1. *Acute diffuse glomerular nephritis* (acute nephritis acute glomerular nephritis, acute hemorrhagic nephritis, intracapillary glomerulitis).
2. *Subacute diffuse glomerular nephritis* (fulminatin glomerular nephritis, extracapillary glomerulitis

lassification of the Renal Lesions in Bright's Disease (Nephritis). (*Continued.*)

3. *Chronic diffuse glomerular nephritis* (chronic glomerular nephritis, chronic diffuse nephritis, chronic interstitial nephritis, one of the forms of chronic parenchymatous nephritis in its later stages, secondary contracted kidney).

   N.B.—About 33 per cent of cases hitherto described as chronic diffuse glomerular nephritis are in reality pyelonephritis.

Glomerular Nephritis (primary involvement of the glomeruli, inflammatory nephritis, hemorrhagic nephritis).

B. **Focal glomerular nephritis.**

1. *Focal infectious glomerular nephritis* (benign hemorrhagic nephritis, infectious nephritis, focal hemorrhagic glomerular nephritis, hemorrhagic catarrh).
2. *Focal embolic glomerular nephritis* (embolic hemorrhagic nephritis, embolic non-suppurative focal nephritis, embolic glomerular lesions of subacute bacterial endocarditis, multiple glomerular embolization).

Tubular Nephritis (primary involvement of the tubules, degenerative nephritis, nephrosis).

A. *Albuminuric Tubular Nephritis* (febrile albuminuria).
B. *Edematous Tubular Nephritis* (genuine nephrosis, lipoid nephrosis, chronic nephrosis, diabetes albuminuricus).
C. *Anuric Tubular Nephritis* (bichloride of mercury poisoning).
D. *Hypertensive and Convulsive Tubular Nephritis* (toxemia of pregnancy).

Arterial Nephritis (primary involvement of the arteries and arterioles, vascular nephritis, arteriosclerotic nephritis, nephrosclerosis).

A. *Arterial and Arteriolar Sclerosis* (benign nephrosclerosis, primary contracted kidney).
B. *Arteriolar Necrosis* (malignant sclerosis, malignant nephrosclerosis, necrotizing arteriolitis).

Essential Hypertension.

Dietetic Management of Acute Diffuse Glomerular Nephritis.

he dietetic therapy of this lesion may be divided into two distinct ses: The prophylactic and the actual treatment.

rophylactic Dietetic Treatment.—A very extensive experiment to rmine the influence of diet on the occurrence of acute nephritis been carried out in scarlet fever cases by Pospischill and Weiss. y divided their patients into two groups; the first of these ived a vegetarian diet, the second was given large amounts of t and broth. Each group was composed of 1186 cases. It was iceable that the children that had received the meat had a good

color and were energetic while the others were pale and letha The occurrence of acute nephritis in either group was the same; t being 116 cases of nephritis, that is, 9.78 per cent among the v tarians, and 118 cases or 9.95 per cent among the meat-ea From these observations, it would seem justifiable to conclude an abstinence from meat and meat products does not in any prevent the occurrence of nephritis; in another direction, that i the maintenance of nutrition and vitality, the vegetarian di definitely deficient as compared to the effect of the foods contai meat or meat products.

Actual Dietetic Treatment.—In the dietetic treatment of an ac acute diffuse glomerular nephritis, one can afford to be extr because the disease exists for a short period only and it is poss to prescribe very bland diets without doing the patient any ha The diets in favor at present consist largely of bland fluids such orangeade, lemonade, or weak tea, fruits and starchy materials, s as gruels, arrowroot, cornstarch, sugar, honey and potatoes. Wit two weeks after the onset of nephritis a full diet without the us spices and a limited amount of salt may be gradually resum Since the period of rest in bed after an attack of acute nephri usually exceeds this limit, the possible debilitating effect of the fo need not be considered because it can be compensated for sub quently. We can therefore conscientiously give the kidney ev benefit of moot questions and order only those foods for the pati which certainly will not damage the kidneys.

Renal Insufficiency.—The impairment of renal function in t form of Bright's disease is characterized by a urine of small volun (oliguria), of a specific gravity varying from 1.020 to 1.050 and wi a high concentration of urea and a low concentration of sodiu chloride. The amount of nitrogen retention in the blood (Mye Fine and Lough), the increased urea ratio (Mosenthal and Bruge and the diminished urea clearance (Van Slyke *et al.*) are indicati of the degree of renal insufficiency.

The dietetic treatment of acute nephritis already discussed abo need not be altered when impairment of renal function occurs pr vided, of course, oliguria or anuria does not persist and nitrog retention does not become extreme. In the face of the latter, t low-protein intake must be maintained.

Hypertension.—The hypertension occurring in acute diffuse gl merular nephritis has been ascribed by Blackfan to an edema of t brain. It is known from the work of Cushing and others, that increased intracranial pressure will result in a rise of blood pressur Consequently, it is perfectly logical to regard cerebral edema as reason for the elevation of arterial tension in acute nephritis.

The blood pressure in this disease is transient, however, an furthermore, does not yield to dietetic treatment. Consequentl from this point of view it is futile to pay any particular attenti to it. In acute diffuse glomerular nephritis the urgent need is treat the renal lesion and the necessary dietetic therapy for this h been previously outlined. When convulsive seizures manifest the

s as they often do, supposedly because of the increase in intra-al pressure, dietetic treatment will have no effect either on them the hypertension.

ema.—In this form of nephritis, edema produced by damage to apillaries is prone to occur. It is not found in every case and is he necessary accompaniment of this kidney lesion. When it occur, presumably it is produced by an injury to the capillaries ighout the body which is similar to the damage associated with lomerular capillaries in these conditions. At times the edema bed to a lowered albumin content of the blood is also found. is frequently spoken of as the nephrotic component in these . The edema brought on by cardiac failure may occur in the e form because of myocardial degeneration. Anemia does not itute an important element in the production of edema in acute ritis.

ie duration of the acute stage of this disease is, as a rule, so t that particular attention need not be paid to the edema except r unusual circumstances. At times, the accumulation of fluid mes so great that it is threatening to life and mechanical removal the chest and abdominal cavities becomes necessary. In most nces, however, persistence of the edema is best treated by a t salt-free diet (page 257), by an increase in the protein content e food and by a limited fluid intake.

ie latter may be carried out by restricting the amount of liquid h is taken. Usually 750 to 1000 cc. is the quantity allowed. so-called Karell diet (about 4 glasses, 800 cc., of milk a day) ten resorted to for the accomplishment of these ends. The ction to the Karell diet is that it contains a great deal of salt that it does not furnish a sufficient amount of protein to main-nutrition. As an emergency measure it may be of value for t periods. It has been established that it is the sodium fraction he sodium chloride that is responsible for the retention of xcess of fluid. The chlorine apparently is of no importance in connection. In providing substitute salts for sodium chloride, should be borne in mind, because a good many of the commer-salt substitutes are sodium salts of other acids and consequently, the same action on the production of edema as sodium chloride . When Widal and Javal and Strauss published their "Observa-s of the Relation of Salt to Edema," in 1902, it was thought this was the only factor concerned and that all cases of abnormal l retention within the body could be favorably influenced by a riction of this substance in the diet. However, it has been nitely shown that this is not correct and that though in some ances the edema can be very satisfactorily controlled by salt riction, in some it is only a part of the cause, and in others ually of no influence at all. If substitutes are to be made for um chloride they should be made with potassium or calcium s, and not with those that have sodium as a base. Potassium calcium in themselves have a diuretic effect at times, while um does not.

It is now definitely appreciated that urea is a potent diu A high-protein diet will result in the accumulation of urea w the blood and thus favor the elimination of urine. In add a high-protein diet will tend to set aside anemia and malnutr and thus act as a preventive for the types of edema tha incident to a lowering of the blood albumin. When the imme crisis in a case of acute glomerular nephritis has passed, a h protein diet is indicated for the alleviation of symptoms and prevention of complications. There are some objections to a diet on the ground that it will injure the kidneys, but the t of opinion is that no harm is done to the renal parenchyma by t foods.

Fluid restriction should not be carried to extremes for any le of time. It must be realized that to a great extent in every pe the fluid output and intake balance one another. This is only true for normal persons, but in edematous conditions as w When edema exists there is a tendency to retain a certain amo of fluid within the body because of the anatomical and functi changes which have occurred, and quantities of liquid above quota are very frequently eliminated and not held back. There certain exceptions to these findings, but they can usually be chec by clinical observations and corrected accordingly by regulation the fluid intake.

Anemia.—Since a number of factors, such as hematuria, prote uria, edema, toxemia, a prolonged period of low-protein feeding a renal insufficiency tend to favor the production of anemia in ac diffuse glomerular nephritis, the more prolonged the disease, greater the probability of developing secondary anemia. In a gr many instances, however, the lesion heals promptly and little or anemia occurs. If anemia does supervene, the underlying factor factors must be remedied if possible. Higher protein rations (60 80 grams) are definitely indicated provided, of course, the deg of nitrogen retention is not marked. This should be supplemen by iron and liver.

Since his original researches on ascorbic acid, Szent-Györgyi a others have reported on the favorable effects of this vitamin on t hematuria and proteinuria of acute nephritis. It must be poin out, however, that recent studies by Miller and his associates fai to confirm this observation.

Uremia.—With the advent and recognition of blood chemis about 1915, it became evident that the convulsive seizures and oth signs and symptoms indicative of the uremia accompanying ac diffuse glomerular nephritis were not associated with retention urinary excretory products. This was a great surprise to clinicia and led them to search for a cause other than renal insufficien Blackfan and others, as previously indicated, have put forward t theory that edema of the brain and a consequent increase in int cranial pressure is responsible for this variety of uremia. Because the presence of convulsions and spastic phenomena, this form uremia has been variously called the convulsive, the epileptic,

sthenic type of uremia. This is done largely to differentiate it n the uremia incident to insufficient kidney activity which is ally spoken of as asthenic or retention uremia. No special etic therapy is indicated when this complication occurs in the rse of acute diffuse glomerular nephritis. The foods mentioned he outset of this discussion should be adhered to.

ummary.—Table 25 summarizes the dietetic management of te diffuse glomerular nephritis. The manner in which this plan t be modified when renal insufficiency, hypertension, edema, mia and/or uremia supervene has been discussed adequately.

TABLE 25.—**Dietetic Management of Acute Diffuse Glomerular Nephritis.**

		Daily diet.					
iod.	Symptoms and signs.	Protein.*	Carbo-hydrates.	Fat.	Total calories, cal./Kg.	Water, cc.	Salt, grams.
o 2 eks	Hematuria, oliguria, edema and proteinuria	Minimal	Liberal	As desired	As desired	800–1000	Less than 2
o 4 eks	Proteinuria persisting	Moderate 20–40	Liberal	As desired	30†	1500–2000	2–4
) — eks	Minimal proteinuria persisting	Full 60–80	As desired	As desired	30	As desired	As desired

The modified O'Hare diet (page 281) may be used to order the desired protein ons.
The caloric requirements are considerably higher in children.

Dietetic Management of Subacute Diffuse Glomerular Nephritis.

Chis is a term that is often applied to a nephritis that is prolonged ond the acute stage and is in the process of becoming chronic. rchand (1882) and Löhlein (1907) who first discovered and debed this form of nephritis had a different renal lesion and clinical ture in mind. Clinically, these cases run a fulminating course l suffer a fatal termination within a few weeks to a few months ause of a rapidly advancing renal insufficiency. Anatomically, y are characterized by an extracapillary (*i. e.*, the region between glomerular tuft and Bowman's capsule) accumulation of inflamtory products and a rapidly progressive destruction of the meruli. Thus far no form of treatment, dietetic or otherwise, been found which influences this anatomical process. The diet the presence of subacute diffuse glomerular nephritis therefore uld be adjusted to the threatening functional changes in this dition, that is, the diminished renal function and its sequel, ention uremia, and in some cases to the edema, though the latter ally is of minor importance.

Dietetic Management of Chronic Diffuse Nephritis.

General Dietary Considerations.—There is a widespread belief t protein foods injure the kidneys, while carbohydrates and fats

do not. These ideas, though firmly adhered to for many ye have no or very little clinical or experimental evidence to supp them. The administration of a diet in which carbohydrates and predominate has the advantage of reducing the urea and other n protein nitrogenous constituents in the blood and tissues. The advantage of such calorie-producing, non-tissue replacing diet that they favor the development of obesity and secondary anem result in lassitude and weakness and, although they do not dam the kidneys, they may, because they do not provide for replacem of lost protein, actually result in the production of a nephritis shown by Barker and Kirk.

A high or normal protein ration presents none of these advanta or disadvantages. The principal argument against it is that damages the normal kidney to a certain extent and is even m harmful for the less resistant kidney which is the seat of a nephrit A brief analysis of the existing data in this field is of interest.

In the first place it may be logical to consider the effect of prote in the food upon the normal kidney. Lieb, Tolstoi, and McClell and DuBois reported that two men living on an exclusive meat-f diet containing 100 to 140 grams of protein daily, for one yea showed no signs of renal damage or other evidence of Bright disease; Lieb studied Stefansson, the Arctic explorer, who had live for nine years on a meat and fat diet and found no evidence of cardi renal involvement; Thomas was unable to show that the high-mea diet of the Eskimos was harmful; and Krogh and Krogh found tha the Greenland Eskimos, who consumed a diet of approximatel 280 grams of animal protein, 135 grams of fat and 54 grams of ca bohydrate, were free from renal disease. It has been stated b some that none of these data is at all conclusive because these diet are no higher in protein content than the average. This the writer do not believe to be correct. Sherman found that the average intak of protein was 42 grams per day and that this sufficed to preven a nitrogen loss. Ashe and Mosenthal found that, in 1000 resident of New York, the average consumption of protein was 30 to 50 gram a day, that 60 grams was a very high intake and that 90 grams wa very rarely indulged in. The above protein rations varying fro 100 to 280 grams a day may therefore be regarded as distinctly high

A much more radical experiment in this field is that of Newburgh Lesses and Johnston who for six months fed a normal man th enormously high-protein diet containing protein 338 grams, fat 27 grams and carbohydrate 96 grams, making a total of 4177 Calorie The sources of the daily protein were as follows:

Fresh beef liver	400 grams
Fresh veal round	300 grams
Fresh beef tenderloin	700 grams
Dry beef	100 grams

The consumption of about 3 pounds of meat a day, some of it i dry concentrated form, entailing a protein intake four to eight time as large as that of the average individual, resulted in no retin

nges, no rise in blood pressure and no subjective disturbances. re was an increase in the number of urinary casts and some uminuria; these disappeared ten days after the diet was disconied. A transient slight hematuria and albuminuria after the stion of such enormous amounts of proteins for a period of six iths is ample testimony of the correct conclusions of the investiors previously mentioned. It may therefore be accepted that in n no habitual diet, however high in protein it may be, will nage the normal kidneys. In fact, some evidence has accrued t a higher protein intake will result in an increased clearance of a by the kidney as witness the observations of Jolliffe and Smith o found that the urea clearance in dogs may be raised over per cent by changing from a low-protein to a high-protein diet. nephritics, Cope observed that a reduction in the protein intake n 75 to 40 grams per day was accompanied by a lowering of the a clearance and this finding was confirmed by Goldring and his ociates in normal man. In children with nephrosis, Farr obved an increase in the urea clearance when the protein rations in diet were augmented and since the same amount of urea given mouth failed to increase the clearance to the same degree, Farr cluded that the stimulation to renal function brought about by h-protein diets was due to products other than urea.

'ery much higher protein diets, that is, a great amount in portion to weight, have been fed to rats by numerous observers. e short span of life of these animals makes it possible to carry experiments in a comparatively brief period that would correond to a decade or more in the existence of a human being. Exces-e protein rations in rats have resulted either in producing no ect on the kidneys, or in causing hypertrophy of the kidneys, in bringing about renal lesions similar to those met with in Bright's ease. In order to cause these changes, huge amounts of protein re fed over long periods and extra burdens were placed upon the naining renal tissue by unilateral nephrectomy, working with egnant animals, or resorting to both expediments. In recent years, anutin and Ludewig and Blatherwick and Medlar showed that reasing pathologic changes occurred in the kidney remnants of rtially nephrectomized rats fed increasing protein rations. The tologic changes noted (Medlar and Blatherwick) were sclerosis the glomeruli with or without obliteration of the capsular spaces, erstitial fibrosis, chronic inflammation and cystic dilatation of proximal convoluted tubules. In rats with nephrotoxic nephis produced by antikidney serum (Masugi nephritis) Farr and nadel found the clinical course adversely influenced by increasing amount of protein fed to these animals. A progressive destrucn and scarring of both glomeruli and tubules were the important thologic changes observed (Smadel and Farr). These results uld point to the fact that there is a limit to the excretory strain to ich a normal kidney may be subjected without showing hyperophy or degenerative pathology, but it does not imply that an ual task is ever imposed on the renal parenchyma in human beings

nor that the lesions, when they are once produced, will not h The applicability of these experimental results to normal kidn in man is therefore of doubtful value.

Even if the protein foods do not harm the normal kidney it m well be asked, will they not damage the diseased kidney wh tissue is presumably much more vulnerable than that of the heal renal parenchyma? Changes which occur in the kidney may considered under two heads: hypertrophy; and inflammation a degeneration.

Hypertrophy of the kidney tissue comes about when a cert number of glomeruli and tubules are destroyed. It is a compen tory process. It is readily studied in those patients on whom u lateral nephrectomy has been carried out. The remaining kidn increases in size through an enlargement of the individual secreto units, not through their multiplication. It is well known that p sons with only one remaining kidney, which hypertrophies within short time, have no disturbances attributable to renal affection have on clinical tests a normal kidney function, and as time pass although they indulge in a normal amount of protein food, they d not develop a nephritis. This is the main evidence we have of th susceptibility, or better the lack of it, of the hypertrophied glom eruli to the effect of the end-products of protein metabolism. Fro this it is reasonable to conclude that a compensatory hypertroph of the glomeruli and tubules is not a contraindication to the presen of proteins in the diet.

The evidence concerning the effect of urinary excretory product upon the kidney is necessarily very limited because whatever treat ment a case of chronic nephritis receives, it is not certain wha influence the therapeutic measures may have had upon the progres of the lesions in the kidney. Squier and Newburgh have carrie out some feeding experiments in patients with chronic nephritis during a control period they allowed them 33 grams of protein day, and then raised this to between 100 and 175 grams a day The larger amounts of protein increased the albuminuria, the num ber of red blood cells in the urinary sediment as well as the edema and in some instances there was an exacerbation of a retinitis The amount of protein in the food was two to three times as high as would ordinarily be given to human beings to effect a nitrogen balance. Consequently, the strain of this diet would be greate than that ordinarily imposed. Furthermore, there is no evidence even if the albuminuria, hematuria and edema did become greater that this was necessarily a sign of an augmented pathological process but it may have been the reaction entailed by increased physiologica activity. It is worthy of note in this connection that the urine o normal control subjects also showed a rise in the number of re cells when the high-protein diet was given. In this regard, the observations of Aldrich and Boyle are of interest. In 40 children with chronic nephritis maintained on low-protein diets, they found that the institution of high-protein, high-vitamin diets was asso ciated with definite clinical improvement. The high-protein diet

not cause elevation of the blood-pressure or increase the non-
tein nitrogenous constituents of the blood as a whole.

'he high-protein diets used successfully in tubular nephritis
Epstein, Peters and Bulger, Barker and Kirk go far to show that
h a method of feeding does not damage the kidneys. A very low-
tein diet induces anemia and a lowered vitality which is generally
reciated. Barker and Kirk have carried this process a little
ther when they were able to produce very curious effects, that is,
ious to our preconceived therapeutic ideas, on animals. They
nd that a continued lowering of the blood proteins resulted in a
ular nephritis, followed by glomerular involvement and a con-
cted kidney.

Ve have had several patients with a severe chronic nephritis
whom the blood urea nitrogen was at a level between 30 and
mg. per 100 cc.) who have been taking 40 to 60 grams of protein
ay without having their nephritis become noticeably worse during
s period. The very long life cases of congenital polycystic kidneys
r witness to the fact that even though only a remnant of kidney
ction remains it is not necessarily injured by having a heavy
retory burden thrust upon it. A similar observation, showing
t the stress imposed upon the individual remaining glomeruli by
igh blood urea nitrogen does not necessarily result in a progres-
e nephritis, is that of O'Hare, who found that some of his patients
h marked diminution of renal function lived for a very long time.

From all these facts it seems fair to draw the conclusion that, to
the least, the deleterious effect of the elimination of the end-
ducts of protein digestion both upon the normal and the dis-
sed kidney has been overemphasized. It has not been through
nical or experimental observations that we have been led astray
t through believing that the whole matter was so simple that it
ould be taken for granted. While the reports we have at hand
nnot be considered final in some directions, still they distinctly
licate that a normal kidney will not be injured by any usual
ount of protein food habitually consumed by man and that it is
ry doubtful whether the diseased renal parenchyma will be harmed
a similar diet.

On the other hand, it has come to be appreciated that a diet of
ficient protein content with a preponderance of fats and carbo-
drates, what is called by some a lacto-vegetarian diet, brings
out a deposition of fat, an obesity, with all its serious dangers,
oduces a secondary anemia and other debilitating conditions
rough loss of protein to the body. Through these changes favor-
sm is evidenced toward cardiac insufficiency, invalidism and a
emature fatal termination of the illness.

Taking all these matters into consideration, it is advised that
ough protein food be given the patient to result in a favorable
rogen balance; DuBois and Mosenthal and Richards have shown
at this can be accomplished. The protein ration should not be
ver than 40 grams a day and it may be 10 to 20 grams higher.
a noteworthy albuminuria exists, an amount of protein should

be added to the daily allowance to make up for the loss in
urine. That sufficient starch and fat be added so as to furnish
adequate number of calories goes without saying. Such a die
will prevent anemia, malnutrition, and obesity, all of which ar
be dreaded in Bright's disease. Even a higher protein intake
probably be advocated when edema exists. Forty to 60 gram
protein a day will not damage the kidney, and will not elevate
blood pressure. The only possible contraindication to it in Brig
disease is the occurrence of a retention uremia, when we must y
to the inevitable and resort to a high-starch, low-protein diet.

Like protein food, alcohol has generally been regarded as a re
irritant. This concept dates back to the time of Bright (18
since he assumed that the abuse of alcoholic beverages was an imp
tant factor in the causation of the diseases now known collectiv
under his name. It is only fair to state that although alcohol h
long been implicated as an etiologic agent in Bright's disease, there
little direct or irrefutable evidence that such is actually the ca
Only a negligible amount of the alcohol ingested is eliminated
the kidney, a fact which probably accounts for its minimal, if an
nephrotoxic action. Bruger, Localio and Guthrie have shown th
the consumption of alcohol or alcoholic liquors in moderate amoun
is not harmful to the normal or diseased kidney, excepting t
arteriosclerotic kidney. They found that alcohol rarely increas
the proteinuria in patients with Bright's disease and that it does n
increase the number of casts and red blood cells in the urine n
does it augment the impairment of renal function of patients wi
acute or chronic diffuse glomerular nephritis. In patients wi
arteriosclerotic nephritis, however, they found that alcohol produce
a transient increase in the number of casts and red blood cells in th
urine and temporarily aggravates the functional impairment of th
kidney.

Alcohol in sensible amounts may, therefore, be used to stimula
the appetite or increase the caloric value of the food when thos
indications are to be fulfilled in any form of nephritis, exceptin
arteriosclerotic nephritis. This has been carried out successfully fo
many years by a number of physicians.

Renal Insufficiency.—As the glomeruli become destroyed throug
inflammatory processes and ultimately by fibrosis in any form o
chronic Bright's disease, it is found that the remaining hypertrophie
glomeruli put out a larger quantity of urine than was characteristi
of the completely intact kidney. This results in a comparative poly
uria and a lowering of the specific gravity. By means of the aug
mented urinary volume, the elimination of solids is kept at a norma
level. This phenomenon is usually looked upon as a compensator
polyuria and such kidneys are regarded as instances of chron
nephritis in the compensated stage. When the glomeruli are de
stroyed in increasing numbers, the time comes when the amoun
of urine is lessened. Because of this, the total output of solid
must necessarily diminish. When this occurs, the decompensate
stage of chronic Bright's disease has begun.

n the earlier stages of the kidney condition, while impaired renal ivity is compensated for its inability to concentrate by an eased urinary volume, it is inadvisable to carry out any far-hing dietetic restriction. The patient usually drinks enough ter to satisfy his needs and great care should be taken that a icient amount of fluid is drunk to produce a large volume of urine. some instances it may become necessary to urge the patient to this. At times the polyuria becomes so marked as to be irk-ne. In these cases it is frequently advisable to curtail the salt ake and sometimes the protein, so that the quantity of urine l be diminished, because there is less demand for the excretion salt and urea. One of the main points to bear in mind in these es is that the restriction of proteins in the diet will have a ten-ncy to lead to anemia and that these food materials should not diminished unduly. We have already seen that proteins do damage the kidney and that there is no object in depriving the ient of them on that account. If they are not given in adequate ounts, they will hasten the advent of secondary anemia which o prone to bring about a fatal termination long before an uncom-cated renal insufficiency will.

When the decompensated state is reached, very often the forcing fluids will aid in the elimination of solids and keep the blood clear an excess of urea and other non-protein nitrogenous materials. e proteins in the food need not be curtailed to any extent unless blood urea nitrogen reaches a level of 40 mg. per 100 cc. or over. hen such a stage has been reached it is advisable to cut down the oteins to 40 or 50 grams a day, and to add a corresponding number calories to the food either in the form of carbohydrates or fats. other words, it is indicated to increase those digestive products ich will not be eliminated by the kidney and to diminish those ich leave a digestive residue that is excreted by the renal route. When the urea nitrogen rises to 60 mg. per 100 cc. or higher, then becomes necessary to resort to a diet containing even less protein d a larger amount of carbohydrates. If there is no nausea or miting, fats may be allowed. When these complications exist ually carbohydrates are more readily tolerated. When retention emia has actually manifested itself a diet consisting of the nimum amount of protein and a maximum amount of carbohy-ates is in order.

In these cases the management of the salt intake furnishes a her difficult problem. It is well known that salt in these instances l result in symptoms that cannot be differentiated from those aracteristic of retention uremia. On the other hand, the salt pletion of the body results in almost identical symptoms. The ly possible method by which we can render these patients as nfortable as possible, in the terminal stages, is to determine the od chlorides and give them salt when indicated and deprive them it when the chlorides in the blood are at a normal level or above it. The optimal amount of fluids for these patients is usually about 00 cc. The larger the quantity of urine, the more efficient will

be the elimination of solids. Water is the blandest diuretic have, and the one that is least likely to damage the kidneys. C sequently, the administration of 2 to 3 liters of fluid a day constitu the ideal adjustment of this problem. An amount above 3 li a day, even if eliminated, will probably not result in an increa excretion of urea or salt.

Hypertension.—An elevated arterial tension has long been rec nized as an inevitable accompaniment of chronic diffuse glomeru nephritis. In most patients, the blood pressure rises when re insufficiency supervenes and is characterized by an elevation of b systolic and diastolic tensions. At times the hypertension m become so extreme that the signs and symptoms thereby produ may closely resemble those seen in the "malignant" phase of ess tial hypertension. Frequently in these patients an early exi appears imminent from some vascular accident and full attenti must be focussed by the physician on this phase of the problem the exclusion of all the other accompaniments of chronic nephri (Mosenthal and Lander).

There is no specific dietetic management for the hypertension chronic diffuse glomerular nephritis. Suggestions as to diet which w be discussed in the section on the dietetic treatment of essenti hypertension (see page 257) are applicable here.

Edema.—The edema, characteristic of chronic diffuse glomerul nephritis, is similar in nature to that occurring in the acute form At any time there may be acute exacerbations of the chronic sta which then should receive the same treatment as is accorded t edema occurring in the acute type of the disease. The prolonge existence of edema in chronic diffuse glomerular nephritis demands salt-free, high-protein and a limited fluid diet. When marked ren insufficiency occurs, usually the edema disappears spontaneousl if it does not, a compromise has to be made between the diet de manded by the presence of the edema and a marked renal insuff ciency. The latter has already been taken up under the headin of Renal Insufficiency. The possibility in this form of Bright' disease that a lowered blood albumin content (nephrotic compo nent), weakened heart action, or anemia play a rôle, must be kep in mind and appropriate dietetic measures taken to meet suc indications.

Anemia.—In those cases in which the kidney tissue is graduall destroyed by sclerosis, with a progressive formation of the primar or secondary contracted kidney, it is well known that among othe changes which take place there are: (1) a diminution in ren function and (2) an advancing malnutrition and cachexia. I the order of events renal insufficiency, as judged by the bloo urea nitrogen, is usually the first to appear. Generally when th urea nitrogen assumes a level of about 40 mg. per 100 cc. in th blood, a secondary anemia becomes manifest. Most cases of Bright' disease, unless they receive special treatment either by diet or trans fusions of blood, are likely to succumb to the anemia and not liv sufficiently long to become a prey to retention uremia.

nce we know this course of events, it seems only proper that should take every step possible to prevent the onset and the lopment of the anemia.

he diet has to be adjusted for each patient. In general, the rule iously mentioned that the diet should contain at least 40 to rams of protein a day plus an amount equal to that lost as albu- in the urine holds good. If there is no nausea and the appetite rants it, amounts higher than this quota may be properly in- ed in. A sufficient number of calories should be provided in ches and fats to maintain nutrition.

here has been sufficient clinical observation and experimental lence to show that sufferers with Bright's disease can very dly assimilate such amounts of protein food. The type of pro- which is given these patients is intended to replenish the defi- t body tissues, and to make good the loss of red blood cells and oglobin. According to Whipple, the most efficient foods for regeneration of hemoglobin and red blood cells are liver and ney of warm-blooded animals, and among fruits, apricots, peaches prunes. The effect of meat (muscle) is good but not as valuable iver or kidney while dairy products, fish, sea food, vegetables, ns and many fruits are relatively inert as regards their ability produce hemoglobin.

nly when there is a marked impairment of renal function, as cated by a blood urea nitrogen of 50 mg. per 100 cc. or higher, uld measures be taken to restrict the protein intake. It is well wn that, when the blood urea nitrogen reaches a level of 60 to mg. per 100 cc., a condition exists in which the renal function almost been reduced to the vanishing point. Under these cir- nstances, there is always danger that the blood urea nitrogen rise with extreme rapidity and that retention uremia may set When these conditions exist it is advisable to consider the ient as having signs of a threatening retention uremia, and to it the case accordingly.

Jremia.—This is brought on by the retention of urinary excretory ducts and results when there is a deficient elimination of urine, ther this be due to Bright's disease, obstruction of the urinary t, or any other condition. The exact substances that are respon- e for the occurrence of retention uremia have not been isolated. a, uric acid, creatinine, salt and many others have been singled but proof has been lacking to show that they are individually lame for the development of the toxic symptoms. It is much re likely that the sum of all the crystalloids that are ordinarily reted in the urine serves to bring about the uremia in question. times, there may be an acidosis; in other instances, these signs cidosis are lacking and death comes on in spite of their absence; level of the blood urea varies a great deal in cases with fatal nination; the sodium chloride may be below the normal level what has been noted is that when this was restored to the aver- the symptoms were less intense. And again the sodium chloride be above normal, substantiating the fact that an excess of salt

will induce symptoms that are identical with those of reten uremia. There are a few signs which we may use as guide-pos the dietetic and other treatment of retention uremia. One of t is a normal acid-base balance within the body for which the ca dioxide combining-power of the blood is usually taken as an in It is found that patients are much freer from symptoms if the sod chloride content of the blood is kept at an approximately nor level; this requires adjustment every few days if the best results to be achieved. Finally, we have the blood urea as an index treatment; in a measure it is of no importance whether the bl urea is high or approaches the normal, since it is known that ure itself in such concentrations as occur in human beings even w marked renal insufficiency will not bring about symptoms of ure poisoning; however, the blood urea may be taken as an index of retention of all the urinary excretory products and if it is high is permissible to assume that not only the urea but all the ot substances ordinarily excreted in the urine are retained as w The opposite holds true, namely, that if the urea is diminish efforts in reducing the quantities of other toxic materials with the blood have also been successful.

The early and preventive treatment of this condition has alrea been discussed under the heading of renal insufficiency. Wh kidney function becomes so much curtailed that the urea nitrog rises to a level of 60 mg. per 100 cc. or more of blood, or when a acidosis exists in the presence of diminished kidney function, th we may consider the case as threatened with retention uremi Usually the treatment of this state accomplishes no very satisfacto results. The fatal termination may be delayed almost indefinite in many cases by a very strict regimen, but the condition of th patient is such as to render the continuance of life almost more a burden than a pleasure to the patient himself or his friends an relatives.

Possibly the most important point in the dietetic manageme of these cases is that the fluid intake should be augmented to th greatest possible degree. Water and fruit juices are universall recommended. Tea and coffee are forbidden by some, but th consensus of opinion at present seems to be that they do no har and that they are forbidden largely because of tradition. Miner waters, plain or flavored, such as ginger ale, are excellent. Alc holic beverages have been commonly forbidden, and on clos analysis it is difficult to realize the reason for this; certainly the are not advocated in excess by any physician. In rational amoun the alcohol acts as a food which is completely oxidized to carbo dioxide and water, and leaves no residue for the kidney to excret this would make alcohol an ideal food and drink for the patie suffering with retention uremia. When fluid cannot be given b mouth, then, gavage, infusions, hypodermoclyses, retention enemat or the Murphy drip must be resorted to. In many cases the pro cedure of gavage is more efficient and less irksome to the patien than any other means of administering fluid. In this way the kin

ell as the amount of fluid desired can be given without trouble with the greatest benefit toward stimulating the formation of e. The amount of fluid necessary in these cases is from 3000 00 cc. a day. Amounts above 3000 should be given for a short only. For daily use over long periods, 3000 cc. a day is cient.

he diet aside from the question of fluid regulation has to be nged in respect to the intake of proteins, total calories and um chloride. When nausea and vomiting or mental unrest vent the administration of the ideal diet, then compromises e to be made between what is indicated and what is possible.

n the presence of retention uremia, it is usually necessary to down the proteins to the minimum even though it is realized this does not provide a maintenance ration for the tissues. It nown that during starvation the amount of protein destroyed he body is equivalent to about 50 grams a day, but that if bohydrates and fats are fed, the amount of protein destroyed hin the organism can be reduced to about 20 grams daily. ides being less of a drain on the body tissues, this also requires excretory activity from the kidneys. Consequently, a diet high in starches and fats and as low as possible in proteins dministered to these patients. It may be noted that alcohol ly fulfils the same purpose as the carbohydrates or fats.

he level of the blood urea nitrogen may be utilized as an index a low-protein, high-starch and fat diet. If the blood urea nitro- is at a level of 65 or over, this diet should be used as intensively possible. When the blood urea nitrogen drops below 65, the teins may be increased somewhat, but should not be raised to a l of 40 or 50 grams until the blood urea nitrogen is at a level of mg. per 100 cc. of blood.

s regards the use of sodium chloride, this should never be given arge amounts. A quantity of about 5 grams a day is usually that is required when the chlorides in the blood are somewhat inished; if these have reached a normal or high level, a salt- diet is indicated so that the situation may be under control. s remarkable how many of the symptoms respond to the simple edient of chloride regulation (Landis *et al.*).

he acidosis, as far as diet is concerned, can be controlled to a ain extent by the low-protein diet previously referred to. Such iet, as well as the considerable amount of fluid, favors the elim- tion of the acid substances within the body and prevents the umulation of them as well. The finer points in the treatment acidosis must be judged by the carbon dioxide combining- ver reaching a level of 30 volumes per cent or less. It is essary to be very cautious so that the condition is not over- rected and that alkalosis is not produced. The amount of alkali essary to overcome acidosis in retention uremia is comparatively ll. Each case, to a certain extent, is peculiar unto itself. If decided to use the alkalies to the utmost, their administration uld be controlled by observance of the carbon dioxide combining-

TABLE 26.—**Dietetic Management of Chronic Diffuse Glomerular Nephritis.**

		Daily diet.					
Period.	Symptoms and signs.	Protein,* grams.	Carbohydrates.	Fat.	Total calories, cal./kg.	Water, cc.	Salt, grams.
Compensated stage. No renal insufficiency	Compensatory polyuria may be present	60–80	As desired	As desired	30†	As desired	As desired
Decompensated stage. 1st phase	Urea N 20–40 mg. %	60–80	As desired	As desired	30	As desired	As desired
Decompensated stage. 2d phase	Urea N 40–60 mg. %	40–60	Liberal	As desired	30	3000	As desired, if no edema exists
Decompensated stage. 3d phase	Urea N over 60 mg. % (may be over 80 mg. %)	20–40	Liberal	Reduced (poorly tolerated)	Reduced	3000	Governed by blood chlorides and presence or absence of edema
Decompensated stage. 4th phase (retention uremia)	Urea N over 80 mg. %. Nausea, vomiting, diarrhea, acidosis and coma	Minimal	Forced particularly in infusions	Reduced (poorly tolerated)	Reduced	3000–5000 (infusions and clyses)	Governed by blood chlorides. Edema rarely present

* The modified O'Hare diet (page 281) may be used to order the desired protein rations.
† The caloric requirements are considerably higher in children.

er of the blood, which should not be allowed to rise above 50 0 volumes per cent. The actual control of an acidosis by the inistration of an alkaline diet has not been resorted to in the tment of retention uremia up to the present time.

he acidosis accompanying renal insufficiency is due to the imulation of acid salts, largely phosphates and sulphates, which derived from the catabolism of protein material. This condi- may therefore be largely controlled by regulation of the amount rotein metabolized. This is best accomplished by a system of etic management exactly similar to that outlined for the treat- t of retention uremia, that is, a minimum protein intake com- d with a forced feeding of fats and carbohydrates with the pose of sparing the proteins as much as possible. The relief he acidosis, incident to diminished renal activity, accomplished his way is much more lasting and satisfactory than that effected the administration of alkalies.

s already indicated, the acidosis of retention uremia is brought ut, at least partially, by the failure of elimination of inorganic ls (phosphoric and sulfuric acids) through the kidney (for discus- of this problem see Peters, 1932). The resultant increase in um phosphates is accompanied by a diminution of serum calcium hown experimentally by Binger and clinically by Marriott and wland, Halverson and his associates, Cantarow and many others. anic manifestations therefore are not uncommon in retention mia and measures must be employed to elevate the depleted um calcium. If associated symptoms, such as nausea and vomit- , are absent, calcium in the form of one of its salts (lactate, glu- ate) should be given by mouth and the foods indicated are those h high-calcium content (see page 172). However, if the gastro- estinal manifestations prohibit their use, one must resort to giving cium intravenously, preferably in glucose infusions. The ad- nistration of parathormone or dihydrotachysterol (A.T. 10) have n employed to elevate the serum calcium by some workers, but description of their use and the side-effects to be sought for are ond the scope of this discussion.

t should be pointed out that muscular twitchings, apparent mus- spasms and even convulsive seizures may occur in uremia which r no relation to serum calcium depletion. The muscular irrita- ty is probably of central origin, resulting either from cerebral ma or ischemia.

Summary.—Table 26 summarizes the dietetic management of onic diffuse glomerular nephritis from the early stages to reten- n uremia. This plan, of course, must be modified when edema l or marked anemia are present and the manner in which this is ne, has already been discussed.

Dietetic Management of Focal Glomerular Nephritis (Infectious and Embolic).

There is no dietetic therapy that directly influences these renal ions. The only method of approach is the control of the primary ocess which is responsible for the nephritis.

Dietetic Management of Tubular Nephritis (Nephrosis).

General Considerations.—The renal and the extrarenal lesion this form of nephritis are largely independent of one another (Ch tian, Wolbach and Blackfan). The anatomic changes in the neys are more or less uniform, while the accompanying disturba vary a great deal. Consequently, there is justification for the that the dominant clinical symptom should serve as a basis classification. According to this scheme there are four type tubular nephritis:

1. *Albuminuric* (febrile albuminuria).
2. *Edematous* (genuine or lipoid nephrosis).
3. *Anuric* (bichloride of mercury poisoning).
4. *Hypertensive* and *convulsive* (toxemia of pregnancy).

The dietetic treatment of the albuminuric form of tubular nep tis is that which is accorded the infection responsible for the kid disturbance; in nephrosis or edematous tubular nephritis the ede receives almost exclusive attention; in anuric tubular nephritis, oliguria and the diminution of renal function are concentrated Thus, in all these forms of nephritis, it is not the kidney that is primary consideration from the therapeutic point of view, but so other phase of the Bright's disease. This is not the place to disc the hypertensive or convulsive tubular nephritis, that is, the toxem of pregnancy, as this may be considered to be largely the duty of t obstetrician and not the function of the internist. (See page 41

Renal Insufficiency.—Impairment of kidney function is chara teristically absent in lipoid nephrosis. When it does exist, we a definitely dealing with an underlying diffuse glomerular lesion whi may or may not be apparent—the so-called "nephrotic componen of chronic diffuse glomerular nephritis (Bannick). The dietet management of this condition is therefore that already describ under Renal Insufficiency in Chronic Diffuse Glomerular Nephrit (page 246).

Impairment of renal function rarely occurs in the albuminur type of tubular nephritis whereas in anuric tubular nephritis (bichl ride of mercury poisoning), retention uremia is not an uncomm complication. The dietetic treatment of nitrogenous retentio described under Uremia in Chronic Diffuse Glomerular Nephrit (page 250) is applicable here.

Blood Pressure.—The albuminuric (febrile) and edematous (lipo nephrosis) types of tubular nephritis are rarely associated with a increase in arterial tension. More commonly, the blood pressure increased in the anuric (bichloride of mercury poisoning) type an as its name implies, invariably elevated in the hypertensive an convulsive (toxemia of pregnancy) type of tubular nephritis.

There is no specific dietetic management of increased blood-pre sure in this form of Bright's disease. Reference should be made Dietetic Management of Essential Hypertension (page 257) f suggestions as to diet.

Edema.—The only form of tubular nephritis in which edem plays a major rôle is that known as edematous tubular nephrit

ine nephrosis, lipoid nephrosis, chronic nephrosis, diabetes ninuricus). In these patients the edema is the predominating re. The subcutaneous swelling is very great and there is ed ascites. The pleural cavities are involved to a lesser extent. edema in these cases is largely accompanied by a lowered albu- and an increased cholesterol content of the blood. Presumably, the diminished osmotic pressure within the blood, because of essened quantity of albumin therein, that is responsible for the vasation of fluid from the blood into the surrounding tissues. stein, in 1917, was the first to apply Starling's observations he osmotic pressure of the serum proteins to account for the a in the presence of depleted plasma proteins. Since that time, clinical and experimental evidence of a confirmatory nature accumulated. The critical level of serum albumin concentra- below which edema is prone to occur is approximately 2.5 grams ent for adults (Van Slyke *et al.*), 1.2 grams per cent for children r and Van Slyke) and 2 grams per cent for the dog (Shelburne). ed to the original observations of Widal and Javal and of Strauss, dy referred to, on the rôle of sodium chloride in the production ema are the recent contributions of Lepore, of Weech, Goettsch Reeves and of Torbert and Cheney. The latter two groups of ers have demonstrated a reduction in colloid osmotic pressure of serum proteins during periods of salt ingestion. Lepore has n that the edema of plasmapheresis (protein withdrawal from blood stream) in dogs can be hastened by an increased intake dium chloride.

he edema in tubular nephritis is occasionally not related to blood ein deficit but to a diffuse involvement of the capillaries, an na comparable to that occurring in diffuse glomerular nephritis. re usually is no anemia and the heart action remains adequate. sequently, there is no edema to be looked for from these sources. dietetic treatment of this state demands the measures men- ed under the nephritic form of edema, that is, the restriction of the limitation of fluid and especially a high-protein intake. last is of importance not only because of the diuretic effect of urea which is produced during the catabolism of the proteins, also because it furnishes the one specific therapeutic procedure nis condition. A high-protein diet, even what may seem to be xcessively high-protein diet, is the best means we have at our mand to replace the depressed albumin concentration in the d. The rule that we should feed these patients 50 grams of pro- a day plus an equivalent amount of protein to that lost in the e may be considered the minimum which should be asked for. erably a much higher amount of protein food should be pre- bed. One hundred to 200 grams a day is not excessive.

is appreciated that the cholesterol is remarkably elevated in e cases of Bright's disease. The natural impulse would be to r the fat content of the diet in order to meet this symptom. ever, it is very doubtful whether the high blood cholesterol is to the inability of the organism to utilize fats, and the results

thus far obtained would point to the futility of diminishing th in the diet. It would seem much more likely that a high fat co with high protein intake would be much more suitable sinc edema apparently is due to some form of malnutrition, and n any lack of proper fat assimilation.

The dietetic régime in these cases is of the utmost importa However, the use of thyroid extract and other medications, adjustment of hygienic factors and physiotherapy should no neglected although they are not mentioned here.

It is indeed remarkable to observe, at times, how resistant edema may be to all forms of therapy, dietetic and otherwise. diminished blood proteins fail to increase in spite of a prolon high-protein diet, even though the nephrotic patient is abl synthesize new protein, presumably, as well as normal man and fact, can retain large quantities of protein and use it for purpos storage and replacement (Keutmann and Bassett). Major st that he obtains the best results in these patients by employin very high carbohydrate diet varying from 600 to 800 grams of c bohydrate a day. He restricts the meat and eggs and makes diet as largely vegetable as possible, thus reducing the intake cholesterol-containing foods. We have had no experience with t type of dietary régime.

To control the hypoproteinemia in surgical patients, Ravdin a his associates employ a high-carbohydrate, high-protein diet su plemented by thiamine chloride. There appears to be some e dence that this vitamin and perhaps the other members of the B co plex as well, are factors in the maintenance of a normal serum pr tein concentration (Field). Ravdin employs repeated transfusio of whole blood or normal serum and the administration of a pepto hydrolysate by rectum. He suggests that hypertonic lyophile seru or amino-acid mixtures intravenously may be effective in increasi the concentration of serum proteins, although, thus far, no eviden has been presented to show that these measures are of value.

The recent observations of Madden and his co-workers worki in Whipple's laboratory on essential amino-acids required for bloo plasma protein regeneration must be considered when proteins a fed. Thus, the ingestion of pure gelatin, which lacks some of the essential amino-acids, is valueless for the synthesis of new bloo plasma proteins unless cystine and either tryptophane or tyrosi are fed simultaneously. Holman, Mahoney and Whipple had pr viously demonstrated that liver and casein are efficient proteins promote regeneration of plasma proteins, since, presumably, the contain all the essential amino-acids. According to Weech, t order of efficiency of some of the food proteins to build blood a body protein is beef serum, egg-white, beef muscle, beef liver, case and gelatin. As desirable as beef serum may be from a nutrition point of view, it obviously lacks palatability.

Anemia.—Anemia is an uncommon finding in tubular nephrit In the anuric (bichloride of mercury poisoning) type, it may oc as part and parcel of the toxemia and renal insufficiency. Its d

management is similar to that described under Anemia in nic Diffuse Glomerular Nephritis (page 248).

emia.—With the exception of anuric tubular nephritis, reten- uremia is rare in this type of Bright's disease. The dietetic ment of uremia in chronic diffuse glomerular nephritis (page is applicable here.

mmary.—The outstanding feature of tubular nephritis, par- arly the type known as edematous tubular nephritis or lipoid rosis, is, as its name implies, the generalized edema amounting mes to an anasarca. A high-protein régime is the diet of choice, endeavor at all times being to elevate the depleted serum pro- s. The use of vitamins and other supplements to the diet are ussed.

Dietetic Management of Arterial Nephritis.

rterial and Arteriolar Sclerosis.—This renal lesion is perhaps e commonly known as benign nephrosclerosis and is brought ut by a slow and diffuse sclerotic narrowing of the afferent rioles. The nutrition of the glomeruli suffer and many become linized and are finally replaced by scar tissue. The kidney may ıme a contracted appearance called by the older writers the nary contracted kidney to differentiate it from the small scarred ney (secondary contracted kidney) seen in the end-stages of onic diffuse glomerular nephritis. In the majority of cases of ign nephrosclerosis, the underlying factor has been hypertension he so-called essential variety of many years' duration. Less than per cent of all cases of essential hypertension succumb to this al complication. The dietetic management of the renal insuffi- ıcy, hypertension, anemia and uremia is similar to that described chronic diffuse glomerular nephritis and reference should be de thereto. When edema occurs in this renal lesion it is brought out solely by cardiac failure resulting from the hypertension and ention should be centered on treatment of the heart.

Arteriolar Necrosis.—*Arteriolar necrosis* is a destructive process alized mainly in the afferent glomerular arterioles. The patho- ic lesion apparently develops as the result of the injury inflicted a very marked and prolonged hypertensive state. It entails truction of the glomeruli and kidney function is rapidly impaired such a degree that death through renal insufficiency is brought on. e treatment, obviously, would be a reduction of the elevated erial pressure. The dietetic therapy is of no moment so far as nephritis is concerned. The food intake must be modified to et the effects of the curtailed renal activity.

Diets.

"Salt-free" Diet (Salt-poor).[1]

Special Precautions.—No salt, salt butter or milk is to be used the preparation of the food nor added when eaten. Salt-free ead and sweet butter may be used as desired.

[1] This diet has been supplied by S. Edward King, M.D., F.A.C.P., as used in Metabolic Clinic of the New York Post-Graduate Hospital.

Omit.—Table salt, salt butter, ordinarily prepared bread, c rolls and biscuits, prepared cereals, milk, buttermilk and all fo of prepared milks, cheese.

Sea foods, red meats (unless boiled and broth discarded).

All meat soups, dried and salted meats, sausages, meat puddi meat extracts, preserved and salted fish as sardines, herrings, an vies, caviar, pickles and all obviously salted foods.

Breakfast.

Fruits: Fruits and fruit juices without restriction (citrus fr grapes and grape juice are particularly recommended becaus high-potassium content). Jams, jellies and marmalades.

Cereals: All cereals cooked without salt and served without m or cream; omit all prepared cereals except those of known low- content.

Eggs: In any form, prepared without salt, milk or cream.

Meat and Fish: All meats and fish permitted, if prepared thorough boiling, and the broth containing the salt, among ot substances, discarded; salted, dried and preserved meats and fi meat extracts, meat puddings, sausages and bacon, stews, ha meat and chicken pies, chipped beef, etc., must be omitted.

Potatoes: In any form prepared without salt.

Breadstuffs: Bread, cakes, biscuits, rusk, rolls and waffles p pared without salt.

Extras: Salt-free butter, honey, maple syrup, jams, jellies, ma malades, sugar.

Liquids: Coffee, tea, cocoa and chocolate; milk is not allowe

Luncheon, Dinner and Supper.

Soups: Vegetable soups (prepared without milk, cream or me stock) and purées without salt or salt butter may be flavored wi onion, savory herbs such as parsley, thyme and bayleaf. Meat sou are not permitted.

Meats and Fish: See Breakfast.

Vegetables: All fresh vegetables permitted without addition salt, salted butter, milk or cheese.

Fruits: All fresh or preserved fruits, jams or jellies.

Condiments: Pepper, mustard, oil, vinegar, garlic, onions ar various savory herbs.

Desserts: Cakes, pies, pastry and puddings (if prepared witho salt), tapioca, cornstarch.

Beverages: Coffee, tea, beer, ales, wines, grape juice, lemonad unsalted tomato juice, orangeade, grapefruit juice. Mineral wate are not allowed.

Suggestions.—Exclusive of salted foods and table salt, most the salt in an ordinary diet enters through the medium of brea salted butter and milk. If these are omitted or satisfactorily pr pared, a salt-poor diet adequate for all ordinary purposes may b obtained. McLester states that a diet in which no salt is added t

Orders:

our total score for the day should be_____portions of Group I.

our total amount of fluid should be_____glasses or cups a day.

our directions for the use of salt are as follows:____________

____

se no spices.

Group I.—Each Full Portion Counts 1.

	Full portion.		Full portion.
d, any kind	1 av. slice	Baked beans	1 T.
dded wheat	1 biscuit	Lima beans	$1\frac{1}{2}$ T.
eda biscuit	5 crackers	Green peas	2 T.
neal	2 T.	Canned corn	$2\frac{1}{2}$ T.
ed rice	3 T.	Mushrooms	4 T.
meal mush	4 T.	Macaroni	$4\frac{1}{2}$ T.
m of wheat	6 T.	Pudding (except cornstarch or tapioca, see Group II)	1 helping
na	6 T.		
iny	6 T.		
, cream or ttermilk	$\frac{1}{2}$ glass	Pie	1 helping
	1 small egg	Cheese	1 T.
or meat, when t to equal	1 T.	Ice-cream	1 T.
		Custard	1 T.

Group II.—No Restrictions.

Vegetables.	Fruits.	Miscellaneous.
aragus	Apples	Arrowroot
s	Applesauce	Arrowroot biscuit
ccoli	Bananas	Butter
ssel sprouts	Blueberries	Candy
rots	Dates	Cornstarch
liflower	Figs	Honey
ry	Grapes	Lard
umbers	Grapefruit	Maple sugar
lrabi	Lemons	Maple syrup
uce	Muskmelon	Olive oil
ons	Nectarines	Sugar
atoes	Oranges	Syrup
npkin	Peaches	Tapioca
abaga	Pears	
nach	Pineapple	
ash	Plums	
ng beans	Prunes	
et potatoes	Raspberries	
natoes	Rhubarb	
nips	Strawberries	
	Watermelon	

the food after it reaches the table and no unusually salted fo
included contains about 2 to 4 grams of sodium chloride daily

Fluids must be restricted in cases with edema. Six hundre
about 3 glasses or cups of fluid, is the minimal amount that is
ible, but the quantity may have to be increased due to inord
thirst.

It is impossible to prescribe a perfectly salt-free diet, due t
fact that the salt content of vegetables and other foods cann
successfully and completely removed in their preparation. H
the term "salt-free" is advisedly used.

Most of the salt substitutes are to be omitted. The ad
criticisms of these various preparations are due to the fact
almost invariably they contain a greater or less amount of the d
mental sodium radical. It has been found that ammonium chl
serves adequately as a salt substitute in most cases.

Modified O'Hare Diet.

The following diet has been modified from that suggeste
Dr. J. P. O'Hare. It has been used with success in the die
management of Bright's disease for many years in the Metab
Clinic of the New York Post-Graduate Hospital. Each of the p
tions in Group I contains approximately 4 grams of protein;
foods listed in Group II contain a negligible amount of protein a
are, therefore, not limited. Thus if it is desired that the pati
take 60 grams of protein daily, he is instructed to plan his diet
such a manner that 15 portions of the foods in Group I are consum
every day; those in Group II are not restricted and may be tak
liberally.

Any combination of the foods listed may be selected. Th
not specified must be avoided. The foods in Group I are restric
according to stated orders; those in Group II are not limited.

CANKER SORES.

Discussion.—Aphthous stomatitis is considered elsewhere (pa
290) but an additional factor is stressed here. These minute ulc
occur in some individuals with considerable regularity just prior
or during the first days of the menstrual flow. Such canker sor
and also more extensive ulceration which is sometimes encounter
usually clear spontaneously with remarkable rapidity with t
passing of the menstrual period. Where they persist, involution
the lesions within forty-eight hours may be secured with tw
daily 15-grain doses of bone phosphate. Excellent results ha
been obtained with friable tablets consisting of equal parts of
calcium phosphate and purified bone phosphate (Grace, 193

High-calcium, high-vitamin diets are recommended but cann
be guaranteed to be effective. So long as the etiology of the con
tion is obscure, only trial-and-error methods are available for u

CHLOROSIS.

iscussion. The dietary requirement indicated in chlorosis is ject to much controversy. The consensus of opinion, however, hat there is an undetermined dysfunction of the hematopoietic em. Chlorosis is evidenced by a rather characteristic blood ure in which the hemoglobin is abnormally low and the indi-ual hemoglobin content of each red cell is moderately less than nal. This clinical entity is regarded by many as being of the ndary anemia type and should be so treated dietetically.

it.

lcoholic drinks
roths
akes
andies
arbonated beverages
ried foods
lot breads and biscuits
Marmalades and jams
Pastries
Pies
Preserved foods
Shell-fish
Spices
Thickened gravies

nit.

oods high in bulk but low in caloric value.
ood mixtures which are generally acknowledged as exhibiting poor culinary judgment, such as stale or left-over meats covered with highly seasoned gravies.

Typical Menu.

eakfast:
ruit
ooked whole grain cereal with milk and sugar
gg, except fried
Vhole grain toast *or* roll with butter
Milk *or* cocoa
ncheon:
Choice: meat, fish, eggs, *or* cheese
Cooked vegetable with butter
Salad with dressing
Whole grain bread with butter
Fresh *or* stewed fruit
Milk
inner:
Soup
Meat *or* fish
Potato
Cooked vegetable with butter
Salad with dressing
Whole grain bread with butter
Fruit *or* simple dessert
Milk

Nutrition should be derived from a full regular diet to whi added an abundance of animal protein. This should be augme by the foods containing high proportions of iron, copper and ganese. This high-protein dietary has been universally ackn edged as being good practice and effective.

The foods especially *recommended* are those suggested Secondary Anemia.

NOTE.—Further menus may be found under Secondary Pernicious Anemia.

Suggestions.—Constipation is frequently associated with chl sis and will necessitate the increasing of roughage, which a tion can be readily included in the preceding dietary. Refe Atonic Constipation and Foods Highest in Cellulose.

The fluid content of the menu will be dependent on the pres or absence of edema. In the presence of edema, salt should markedly restricted and a limitation of fluids should be institu It might be wise to prohibit the use of bicarbonate of soda and called salt substitutes, which in themselves are capable of increas the osmotic tissue tension (due to the sodium radical so commo present).

Naturally, the caloric value of this diet will be dependent the state of nutrition of the individual. It is often necessary for th patients who are underweight to augment the three daily me with interval feedings. Suggestions may be found in the section Underweight (page 558 and 559).

Reference should be made to Foods Most Effective in Increasi Hemoglobin; Foods Highest in Copper, Iron and Manganese.

CHOLECYSTITIS.

(Refer to page 382 and 385.)

CHOLELITHIASIS.

(Refer to page 387.)

CHOREA.

VINCENT LARKIN, M.D.

Discussion.—Chorea is a disorder of childhood characterized b irregular, involuntary purposeless movements of the limbs or faci muscles. These movements are spasmodic in character and ofte accompanied by irritability and loss of power in the affected muscle

When the disease is severe, the patient becomes markedly emac ated. This should be prevented by careful dietary supervisio While lighter than in health, the diet must be of equal caloric valu to replace the energy expended in muscular movements. Patienc is required to secure the ingestion of sufficient food as these patien have difficulty in swallowing.

The dietary should consist of simple, nutritious foods. Durin the active stage, milk, eggs and starchy foods, such as rice, cerea and bread are to be given; during the convalescent stage, the di should be augmented by nitrogen foods in the form of meats, chees

ken and fish. Malt, wheat-germ and cod-liver oil are very useful. ombat the secondary anemia which often develops from prolonged nement in bed, liver and vegetables high in iron, copper and ganese should be incorporated in the convalescent diet. (Refer oods Highest in Iron, Copper and Manganese.) The diet ld be scrutinized for its vitamin content and rectified if sub-nal in any particular.

ggestions.—The choreic movements may sometimes become so nt that restraint is required in order to feed the patient. In connection, hydrotherapy in the form of warm baths may be loyed, and feeding should take place immediately upon the lusion of the bath while the child is still quiescent.

CIRRHOSIS OF THE LIVER.

(Refer to page 385.)

CELIAC SYNDROME

Vincent Larkin, M. D.

he celiac syndrome is a chronic nutritional disturbance of varied logy characterized by loss of appetite, loss of weight, irritability, ominal distension and the passage of abnormal stools. The lious onset of symptoms may usually be traced back to the age ine to twelve months. The full blown syndrome is more often overed in the second year of life, and is often precipitated by ntercurrent infection.

tiology.—Many etiologies have been pointed out as capable producing the syndrome, among them being mechanical ob-ction of the intestine, tuberculous mesenteric adenitis, intestinal dia infection, bacillary dysentary, focal infections outside of the stinal tract, food allergies, and cystic fibrosis of the pancreas. se numerous causes, however, account for only a small per cent he patients presenting the celiac syndrome. The etiology is not lent in the majority of cases. The deficiency of elements of the min B complex and liver extract which are present in all these ents has not been definitely relegated to its place as a primary econdary cause of symptoms. The similarity of the celiac syn-ne and sprue in their symptoms and laboratory data has been d by many observers but the identity of the two diseases has been established.

iscussion.—The clinical picture of the celiac syndrome is ly typical: (1) Loss of appetite amounting to complete refusal ood. (2) Loss of weight, most prominent in the axillary and inal folds and almost complete loss of fat from the buttocks. Abdominal distention. (4) Marked irritability. (5) Suscep-ity to respiratory infections. (6) The passage of frequent, foul, light colored, mushy or loose, greasy or frothy stools. h sexes are equally involved and the disease is found in both and low income families. The disease does not occur in the nt who is still breast fed.

The symptoms and physical abnormalities are a direct resul the child's relative inability to absorb fatty acids and carbohydra These digestive deficiencies are readily shown by laboratory t Gastric and intestinal enzymes are present in normal quanti Small intestinal (jejunum ileum) motility and segmentation defective, as seen by clumping of barium on the roentgenogr this possibly due to deficiency of vitamin B. Fats are split p erly to fatty acids and glycerol, but only 65 to 85 per cent of fatty acids are absorbed (normal 90 to 98 per cent). The free f acids often combine with calcium, to be excreted in the stoo soaps. Low absorption curves of fat soluble vitamin A are obser as part of the defective absorption of fatty acids and other fat uble substances. Low glucose absorption curves are often found the active celiac. Polysaccharides, however, are often not s well in the hypomotile intestine and may be excreted, as undiges starch. Protein is well-digested and absorbed.

The loss of fat and carbohydrate in the stools produces m nutrition in the child. The fatty acids tend to be irritating to t bowel, and produce an excess of water in the stool as well as a fat appearance. Further, the loss of fat soluble vitamins by defecti absorption, of calcium by combination with fatty acids, of water a water soluble vitamins by diarrhea, contribute to the poor nutriti and vitamin and mineral deficiencies. Fermentation of undigest carbohydrate produces large amounts of intestinal gas and abdo inal distention.

Complications.—Malnutrition, rickets, scurvy, iron deficien anemia, osteoporosis, vitamin A deficiency, are generally present the full-blown, untreated celiac. Infections, particularly respira tory, occur frequently and may precipitate a severe exacerbatio of all symptoms. This is called the "celiac crisis" and is marked b profuse diarrhea, severe dehydration, acidosis, and a decrease motility of the small intestine amounting almost to a paralyt ileus.

Treatment.—The management of the celiac child is primaril dietary and secondarily treatment of complications. Dietar management has been divided into three merging stages whic depend on the gradually increasing ability of the treated celiac t digest food.

1. First stage: Protein, which is digested and absorbed with out difficulty by all celiacs, is the predominant food of this stag This stage may last from a few days to a few weeks.
2. Second stage: More protein and simple carbohydrate gradually added as the patient's appetite remains good an stools are normal. This may last for a few months to a year more.
3. Third stage: Complex carbohydrates and later fats are adde to the diet until the normal diet for the age is reached.

Certain general rules should be followed in adding new foods t the diet. A new food should always be started in small quantitie If the food is tolerated, the quantity may gradually be increase

ot tolerated, it may be withdrawn without causing a serious ack in the child's condition. The exact order in which the new ls are added is not as important as making sure that some order llowed. The first foods given are protein, then simple carbo-rates, later complex carbohydrate and finally fats, but a choice be made as to the order in which predominately protein, carbo-rate and fat foods are to be added. A satisfactory diet may be t up for the more severe celiac by starting in stage I, while the ler celiac may be started in stage II of the celiac diet. The wing schedule will be found to be effective in the majority of s:

tage I.—If there is diarrhea, parenteral feedings should replace feedings. When the diarrhea is improving a weak formula may started, such as Mead's Powdered Protein Milk or Acidulated tein, SMA, in a dilution of one tablespoonful to each 4 or 5 ces of water. The total volume of formula is determined by the d's fluid requirement. After a few days of this feeding the ls begin to return to normal and the patient becomes hungry. powdered milk is then increased by 1 or 2 tablespoonfuls a day il a ratio of powdered milk to water of 1:2.5 is reached. Skim k, fortified with 2 or 3 tablespoonfuls of calcium caseinate (casec), also be used but the powdered milks appear to give more con-ently good results. After several days of good appetite and mal stools, the patient is usually able to take other foods.

tage II.—*Vitamin C*, in the form of ascorbic acid or as orange e, and *vitamins A* and *D*, in a fish liver oil concentrate are well-rated at this point. Fifty milligrams of ascorbic acid or 3 to 4 ces of fresh orange juice are given; oleum percomorpheum may given in doses of 15 drops twice a day, or an equivalent amount ther fish liver oil concentrate. *Scraped beef* is a suitable protein l to introduce at this time. *Banana* next, either baked or very and raw, contains an easily digested carbohydrate, and may be en cautiously. If taken without difficulty the quantity may be eased slowly to 3 to 6 bananas a day. Bananas are in no sense ific for celiac disease, but rather provide a safe carbohydrate l. Honey, glucose, levulose, and corn syrup are also well-rated but the ripe banana is more easily taken by the celiac. *ana powder*, 3 to 4 tablespoonfuls may be added to the formula e raw banana is well-tolerated and the child is still hungry. *age cheese*, *gelatine*, and *egg white* are protein foods which may be added to the menu. *Pureed vegetables*, 3 per cent carbo-rate group, add variety to the menu after these other foods. r pureed vegetables of higher carbohydrate content may be n. *Other meats*, like lamb chop, liver, chicken, turkey, add read-ssimilated protein to the diet and make it more palatable as the l tires of the restricted number of foods previously allowed. Fi-y, fresh fruit, minus the coarse skins, again add to the carbo-rate intake.

age III.—After several months of uninterrupted freedom from c symptoms the diet may be increased by the addition of complex

carbohydrates and finally fats. *Breadstuffs, crackers, cereals,* *potato* may be added consecutively if tolerated. *Unstra* *vegetables, fruits,* and *meats* may be given with impunity. W *milk* may be substituted without gradual change for the pro milk formula. *Butter, fatty meats* may be given last.

Sample Menus

Early Second Stage

	(1)		(2)	
Breakfast				
Mashed ripe banana with	1		Orange juice	(½ orange)
Cottage cheese	½ cup		Cottage cheese	½ cup
Protein milk			Mashed ripe banana	1
			Protein milk	
Dinner				
Sieved liver	4 tblsps.		Scraped beef patty	1
Mashed ripe banana	1		Mashed ripe banana	1
Cottage cheese	½ cup		Protein milk	
Protein milk				
Supper				
Chopped coddled egg whites	2		Cottage cheese with	½ Cup
Mashed ripe banana	1		Mashed ripe banana	1
Protein milk			Protein milk	

Sample Menus

Late Second Stage

	(1)		(2)	
Breakfast				
Orange juice	(1 orange)		Orange juice	(1 orange)
Banana, ripe, well mashed	1		Cottage cheese with	½ cup
Soft boiled egg	1		Mashed, ripe banana	1
Zwiebach	1		Zwiebach	1
Protein milk			Protein milk	
Dinner				
Minced veal	½ cup		Minced chicken	½ cup
Carrot puree	¼ cup		Pea puree	¼ cup
Zwiebach	1		Zwiebach	1
Mashed, ripe banana with	1		Banana, ripe	1
Cottage cheese	¼ cup		Protein milk	
Protein milk				
Supper				
Scraped beef patty	1		Coddled eggs	2
Green bean puree	¼ cup		Asparagus tip puree	¼ cup
Zwiebach	1		Zwiebach	1
Banana, ripe	1		Banana, ripe	1
Protein milk			Protein milk	

Treatment with parenteral liver extract and vitamin B comple on alternate days for three to six weeks has been recommended b Blackfan and his associates as a means of effecting a cure of celia syndrome, with or without diet. Complete recovery was effecte by these workers in their series of cases but this result has not ye been completely duplicated by others. Nevertheless, a modifie regimen of intramuscular injection of a B complex — liver con

trate combination 3 times weekly for three to four weeks is to be ommended in the routine treatment of celiac syndrome.

rognosis.—Celiac syndrome is marked by remissions and erbations, the latter often precipitated by acute infections or ary indiscretions. The ultimate prognosis of the properly ated celiac is complete recovery in a period varying from a few nths to a year or more.

OTHER CELIAC-LIKE AFFECTIONS

. **Starch Intolerance.**—A milder condition, similar to celiac ase, has been described by Anderson under the name of rch intolerance". This is a more common condition than the celiac syndrome and consists of recurring bouts of watery rhea, accompanied by respiratory infections and a fair state of rition. It begins about six to nine months of age and has a longed course. The abnormal stools contain large quantities ndigested starch granules but no excess of fat. Examination ancreatic juice reveals a deficiency of the starch splitting enzyme, ylase. The most recent concept developed by Anderson of the r-relationship of celiac disease and starch intolerance postulates t the starch intolerance is a constitutional difficulty in all cases. se patients who manifest only starch intolerance are to be sidered as having a mild form of the celiac disturbance. Those ients who develop the typical symptoms of celiac disease are to considered as having a more severe form of the constitutional rch intolerance plus a secondary deficiency of the vitamin B com- x and perhaps other unknown factors which, in turn, account for steatorrhea and other severe symptoms of the celiac syndrome. atment of this latter group with liver extract and vitamin B nplex overcomes the steatorrhea, malnutrition, and other severe nptoms of the celiac syndrome, but leaves the patient with his ic starch intolerance.

reatment.—Treatment consists of complete elimination of rch from the diet. On a starch free diet, the infant passes normal ols despite recurring respiratory infections. Starch containing ds may be introduced into the diet after several months. Starch taining foods in the infant's diet are cereals, breadstuffs, rice, caroni, and potato.

. **Cystic Fibrosis of the Pancreas.**—Cystic fibrosis of the creas produces 3 clinical syndromes in infancy: (1) mecon- ileus, (2) malnutrition with chronic respiratory infections, celiac syndrome with chronic respiratory infection. There is ross deficiency of the external secretion of the pancreas and as a ult digestion of all foodstuffs suffers. There is inadequate stion and absorption of protein, fat, carbohydrate, and vitamins. wth is markedly retarded and severe, often fatal, pulmonary ctions by staphylococcus aureus hemolyticus take hold. orption of vitamin A is very poor and probably contributes to lack of resistance to pulmonary infection.

The diet must be high caloric, high vitamin with an exce protein and carbohydrate because they are partially lost in stool. Decreasing the fat intake to a minimum increases the abs tion of protein. Pancreatin granules, enteric coated (U. S. P. P creatin), provide some of the lacking pancreatic enzymes and crease the absorption of fat and protein. The following diet c stituents are recommended:

(1) Calories—100 to 150 calories per kilogram
(2) Protein—25 per cent of the total calories (normal 15 per ce
(3) Carbohydrate—about 50 per cent of the total calories (norn 50 per cent)
(4) Fat—low, about 20 to 25 per cent of total calories (norn 35 per cent)
(5) Vitamins high:
  A and D—oleopercomorpheum, 15 drops 3 times a day
  C—50 to 100 milligrams
  B Complex
(6) Pancreatin—if used in formula, 1 gram per 8 ounces of fo mula; if used in food, 3 to 6 grams as enteric coated granules.

The foods which are used are those of the second stage of t celiac diet. These patients, however, must remain on this di indefinitely, as there is no way in which they can manufacture the own pancreatic enzymes.

Pulmonary infections are best treated with penicillin and sulf diazine. Daily doses of sulfadiazine may be given prophylacticall to keep the patients free of recurrence of pulmonary infections.

REPRESENTATIVE DIETS FOR PATIENTS WITH PANCREATIC DEFICIENCY

A. Patients Under the Age of 1 year: 150 Calories Per Kg. Bod Weight.

Breakfast
- 3-4 oz. (90-120 cc.) fruit juice (orange, grapefruit or tomato) o pureed fruit
- 1 egg, soft cooked
- 1 slice of zwieback (may be garnished with jelly)
- 1 mashed ripe banana if appetite is good
- 6-8 oz. (180-240 cc.) formula
- 1 level teaspoon pancreatin

Dinner
- 1-2 tablespoons or more of minced lean meat, broiled, boiled, o roasted only
- 1-2 tablespoons or more of pureed vegetable
- 1 slice of zwieback (optional)
- Dessert: pureed, cooked or canned fruit, gelatin or junket mad with skim milk
- 6-8 oz. formula
- 1 level teaspoon pancreatin

pper

-2 tablespoons of pot cheese or meat; the pot cheese may be flavored with honey, jelly, or banana powder

-2 tablespoons or more of pureed vegetable

Dessert, zwieback, formula and pancreatin as at noon

ning

-8 oz. formula

mula: Calculate to provide two-thirds of total calories; Protein k, to provide three-fourths of formula calories; Banana powder, provide one-fourth of formula calories

amins: Concentrate of vitamins A and D sufficient to provide 000 U. S. P. units of vitamin A per day, given in two or three doses amin B complex; Ascorbic acid, 0.05 gm., if fruit juice is not l taken.

B. Patients Aged 1-2 years

trial with skim milk is made soon after the twelfth month for ients who are doing well; it is usually well-tolerated. Fish is d next. One small serving of starch per meal is added. The nsition to the diet for older infants is made gradually.

C. Patients Aged 3-4 years and Older

akfast

Fruit or fruit juice

-$\frac{2}{3}$ cup cooked whole grain cereal with skim milk and sugar

-2 eggs, prepared in any way except fried

-1 slice of bread or toast, preferably whole grained, with jelly or honey, without butter

or more glasses of skim milk, may be flavored with sugar, cocoa, vanilla, etc.

level teaspoon of pancreatin

nner

Large serving (3-4 teaspoons or more) of lean meat, poultry or fish, broiled, boiled, or roasted, all visible fat to be cut off

3 or more tablespoons of cooked vegetables

small serving of starch, as potato, rice or macaroni

or more glasses of skim milk

Dessert: cooked or canned fruit, gelatin, junket made of skim milk, custard, puddings, or sponge cake

1 level teaspoon of pancreatin

nch or supper

Same as dinner, except that pot cheese may be substituted for meat

tween meals

Any food item included in this list, except starch. Hard candy, sponge cake and arrowroot biscuit may be given

te: The child may receive second portions of any item except rch. Any of the allowed foods may be served in the form of soup frozen desserts, if desired.

tamins Same as those given the first year.

D. General Instructions

Rule for parents:

1. Include only the foods on the list.
2. Do not serve raw vegetables and fruits other than oran grapefruit, apple, banana, pear, peach and lemon juice.
3. Do not use any packaged food of which you do not know ingredients or which contains substances not on the allowed list
4. Do not use flour, corn starch, etc., in the preparation of f without reducing the feeding of starch.
5. Remove all visible fat on meats; broil, boil, or roast only
6. Do not use fats or oils of any kind in the preparation of fo
7. Use only milk which is commercially skimmed. It is n enough to pour the cream from the top of a bottle of whole mi Use 1 quart (1 L.) daily.

Foods Allowed

Meats	*Vegetables*	*Fruits*
Beef	Tomato juice	Strained orange juice
Lamb	String beans	Pineapple juice
Veal	Squash	Grapefruit juice
Liver	Carrots	Grape juice
Kidney	Peas	Lemon juice
Chicken	Asparagus	Lime juice
Turkey	Cauliflower	Juice of berries
Fish	Beets	Bananas
Shellfish	Spinach	Scraped or peeled apples,
oyster	Mushrooms	pears, and peaches
clam	Onions	Cooked or canned apples,
shrimp	Beet greens	apricots, pears, peaches
crab	Eggplant	pineapple
lobster	Broccoli	Strained cranberry juice

Starches: 1 serving per meal only	*Miscellaneous*	*Miscellaneous*
Bread, preferably whole grained	Egg	Lollipops or hard candy
Potato, rice, noodles, macaroni, spaghetti	Pot cheese	Fruit ices
Lima beans, if potato, etc., are omitted	Soup without fat	Cake without fat – sponge, angel food
Split peas, if other starch is omitted	Jelly or jam without seeds	Gelatin
	Marshmallows	Cocoa
	Sugars – white sugar, brown sugar, corn syrup, honey, maple sugar, molasses	Junket
		Custard, including frozen foods

Foods Not Allowed

Meats and Fats	*Miscellaneous*
Butter, oleomargarine	Raw vegetables or fruits not on list
Fat meats, bacon, pork	Luncheon meats, salami, etc.
Lard, Crisco, Spry	Cream candies, chocolates
Fried foods	Crackers
Peanut butter	Cookies, doughnuts, pie
Cheese other than pot cheese	Gravy with fat or flour
Chocolate	Corn
Salad oils, olive oil, mayonnaise	Beans – navy or kidney
Duck or goose	Cake containing fat

r older children, add the following, if trial shows tolerance: ls, melons, berries, small amounts (1 teaspoon) of peanut butter, v nuts, preferably as flavoring.

COLITIS, ULCERATIVE.

Z. Bercovitz, M.D.

troduction.—The problem of nutrition in chronic ulcerative is is one of the most difficult in the entire field of therapy uent bowel movements and lack of appetite have lowered the le of the patient to the point where coöperation in the matter et is almost impossible to secure. Generally, the patient has dy failed to improve on various diets which have been tried onger or shorter periods of time. Since the urge to defecate ollowed the ingestion of many different types of food, the patient have accumulated a long list of distress-provoking foods most hich are erroneously held to be the cause of his symptoms.

scussion.—Chronic ulcerative colitis is an inflammatory condi- of the bowel characterized by frequent movements with or out the passage of blood, mucus or pus and usually associated bouts of fever, abdominal pain of varying degree and changes ie roentgenographic and sigmoidoscopic findings in the lower el. Although the etiologic factors are unknown, several possi- es have been suggested. Occasionally chronic ulcerative colitis followed what appeared to be acute bacillary dysentery. In e instances, Endamœba histolytica has been found either at the et or during the course of the illness. Various bacterial agents been discovered in patients with this condition and been as- ed an etiologic rôle. In still others there seems to be evidence ruses related to that of lymphopathia venereum and a positive test or positive reaction with bowel antigen has been obtained. rogenic factors may be primary or secondary; in any event, must not be passed over lightly but withal they should not me undue importance. Unquestionably vitamin deficiency s coincident with chronic ulcerative colitis. It is not clear, ever, whether the deficiency antedates the intestinal lesion to xtent of being a causative factor or is merely a result of deple- of body stores and failure of replenishment.

every case of chronic diarrhea, diagnostic differentiation must nade between ulcerative colitis and amebic dysentery, bacillary ntery, acute gastro-enteritis due to dietary indiscretions, car- ma, lymphogranuloma venereum, multiple polyposis, diverticu- fistula, and the deficiency diseases.

ndamental Ulcerative Colitis Regimen.—If the diagnosis of nic ulcerative colitis is established and the patient can be oitalized, a basic routine should be instituted before any dietary me is considered. This involves attention to the patient's are as a whole and includes:

Glucose infusions (3 per cent in physiologic saline) intraven- y by the drop method.

2. Blood transfusions at frequent intervals, as every secon
third day.
3. Rest in bed with sufficient sedation to secure cessation o
desirable mental or physical activity.
4. Liver therapy intramuscularly in potent dosage.

Of these procedures transfusion is most important since it pro essential proteins and corpuscular elements; blood may be g daily in 250- to 300-cc. amounts or every other day in 500-cc. tions. If it is necessary for a patient to subsist on glucose, it sh be recognized that lack of thiamin may become apparent (refe page 523). Although thiamin chloride may be administere daily doses of 50 to 100 mg., use of the entire B complex is n desirable.

A high-vitamin, high-protein diet is required by these patie Hydrochloric acid is definitely indicated, especially if there is evidence of failure of gastric digestion.

The Problem of Feeding a Patient With Chronic Ulcerative Col —The disease presents a pathologic state of the lining of the la bowel and physiologic disturbances throughout the remainder the gastro-intestinal tract. The problem of nutrition in th patients involves the relationship between the intake of food the absorption of sufficient nutriment to sustain body tissues, incl ing the bowel wall. It is a common experience to find that coöpe tive patients who are taking an entirely adequate diet not o fail to gain weight but actually continue to lose. Obviously th with chronic ulcerative colitis are unable to utilize the food inges to its fullest extent. Prescription of a diet, therefore, is the le part of the problem of feeding these patients.

When food is taken into the mouth and swallowed, a defecat reflex occurs normally. In ulcerative colitis the desire to evacu the bowels may be exaggerated, but the patient should be reassu that food eaten has not immediately passed from him. In fact has been shown by Roentgen-ray studies in both the small and la intestines that definite stasis exists in some of these cases.

Solid food is generally denied patients with a chronically inflam bowel in the hope that irritation will thus be reduced to a minimu Soft or liquid diets, however, are incapable of restoring the appeti which is the first step in the direction of recovery. It is a phys logic fact that solid food within the stomach increases the tone that organ and consequently the desire for food. Likewise it shou be remembered that, outside of a few very course fibrous items, t average diet reaches the large intestine in a semi-fluid state.

Tart foods, as grapefruit and lemon, improve the appetite witho irritating the colon. These fruits leave a "clean" taste in the mou and are highly beneficial to the stomach.

Patients with chronic ulcerative colitis do not want to eat. Si they are nauseated by the sight or thought of food, it is a task find something which will appeal to them and tempt the tas Neither the eye nor the stomach should be overburdened by t presentation of a full tray. Small attractive servings of one or t

s at a time encourage the patient to eat especially where inter-of rest prevent the development of weariness from overexertion the meal.

ietary Treatment.—The lactofarinaceous diet customarily em-ed is wholly inadequate for maintenance purposes, has a bad hologic effect upon the patient, and delays recovery. It may, ever, be useful for a day or two during exacerbation of the symp-s or at the onset of the disease. The foods allowed include well-ed macaroni and other pastes, rice boiled almost to gruel con-ncy, and strained oatmeal or refined wheat cereals. Thereafter, patient should be offered a high-protein, low-residue diet with a tiful supply of vitamins. The caloric need is met by the addition archy and fatty foods.

ood results have been obtained with beef which has been ped, then chopped fine with a cleaver or knife. Such meat, led to suit the taste, may be served twice a day.

ggs are also an excellent source of protein and can be prepared variety of ways or disguised in other foods. Tart jelly served frequent egg dishes allows for variety and "cuts" the taste he egg. The jelly is also a desirable accompaniment of meat or ken.

oddled and poached eggs are particularly recommended at the nning of treatment. It is often necessary to instruct the ent's family how to coddle an egg. The egg is immersed for to six minutes in water which has been raised to the boiling it, then removed from the heat. This is sufficient cooking for egg which originally was at room temperature.

he use of milk as such is debatable; often it appears to cause gas, ention, discomfort, and diarrhea but there are occasions when k becomes the mainstay of the diet. Buttermilk, however, can n be taken without objectionable sequelæ. Frequently, weak is the only beverage which can be allowed without restriction, then without milk. Coffee is permitted no more than once daily. Ialted milk prepared with water, if necessary, rather than milk vides a nourishing beverage between meals. A tablespoonful of dered malted milk is beaten to a smooth mixture with 3 to nces of water, then an egg is added and thoroughly whipped. e attractiveness of this beverage may be enhanced with vanilla cream.

alorie-rich fluids, such as the foregoing, are substituted as far as sible for water. When beef tea is used for stimulating appetite, volumetric capacity of the patient should be considered and wance made for the ingestion of more nourishing food (refer to e 169).

he desire for food is frequently stimulated by the judicious use art fruit juices. Unsweetened, fresh or canned grapefruit from ch the membrane has been removed is as satisfactory as the e. Lemon is well tolerated even on an empty stomach. It can given two or three times a day as lemonade or diluted with hot

tea. This is an excellent means of introducing vitamin C the diet.

Tomato juice is best served with meals. It is recommended the final allowance of 6 ounces daily be reached gradually mencing with ½ ounce at the midday meal and increasing the in by a like amount until 3 ounces are taken with both the noon evening meals.

As a rule, all vegetables must be puréed. Ingenuity shoul employed in serving these attractively. The less colorful ones be disguised in cream soups or molded in gelatin and served wi salad dressing. A small slice of pickle, when carefully chewed, add zest to the meal and usually do the patient no demonstr harm. By the same token, young and very tender string be may be allowed. The important point is that food fiber must thoroughly softened by cooking. It is recognized, of course, t canning is often more effective in this regard than is home-cooki

Both the caloric and vitamin content of the diet can be enhan with avocado accompanied by mayonnaise. This fruit is smo enough to require no preparation before it is served.

Although puréed fruits in general are often prescribed for ulce tive colitis, such a wide selection has not proven beneficial in experience. Well-ripened bananas (refer to page 140) probab deserve first place in any list of permitted fruits. Apples, such the *Delicious* variety, may be given sparingly if scraped or chew very thoroughly. In the beginning only one-quarter of a peeled a well-cored apple should be tried. Fruits desired by the patie may be introduced cautiously in limited amounts. Stewed prun and apple sauce are frequently not well tolerated.

The ambulatory patient is provided with a copy of the accompan ing form:

DIET for...................... DATE...................

INSTRUCTIONS.

1. The object of this diet is to provide foods which will be easily digeste readily absorbed, and leave a minimum of residue to irritate the bow
2. Your full coöperation in the matter of diet is vital for the proper handlin of your condition.
3. Make no changes without consultation. EAT ONLY THE FOODS ON TH PERMITTED LIST.
4. Please bring this diet list with you at each office visit.
5. Eat some of the following foods at 10 A.M., 4 P.M., and bedtime: Bouillo chocolate-flavored *Vitavose* (Squibb), eggnog, or fruit juice with ho land rusk, toasted white bread, Zwieback.

Permitted.

BEVERAGES:

Bovril, cocoa, coffee, cream, fruit juices as listed, milk when tolerate weak tea, *Vegex*, *Vichy*

BREADSTUFFS:

Bread sticks, dry white toast, holland rusk, melba toast, Zwieback

CEREALS:

Cream of Wheat, farina, hominy, *Pablum*, *Ralston*, strained oatmeal

ʀʏ Products:
Butter, cream, cheese (cottage, Philadelphia cream or process cheese
as *Velveeta*).
ssERTS:
rnstarch pudding, custards, ice-cream without nuts or seeds, gelatin preparations, *Junket*.
s:
ached, soft-boiled, scrambled in double boiler; or used in eggnogs or custards.
ITS:
uréed or canned peaches or pears, ripe bananas or apples, canned or fresh grapefruit without membrane.
IT Juices:
rapefruit, sweetened lemon, tomato; orange and pineapple if tolerated.
ATS:
ef: boiled, broiled, roasted; boiled tongue; broiled fillet; chopped chuck steak or sirloin; beef heart, calves' heart or liver.
amb: roast, boiled leg of lamb, broiled chops.
ork: lean bacon well done, boiled ham.
hicken: roast, boiled, creamed.
ish: boiled or broiled fillet.
PS:
ouillon, lentil or split pea, puréed vegetable in half milk and half cream, strained vegetable made only with those on the permitted list.
RCHES:
acaroni, noodles and other pastes; potato, baked (do not eat skin) or mashed; rice cooked with plenty of water until very soft.
ETABLES:
sparagus, beets, broccoli, carrots, peas, spinach, squash, string beans, swiss chard (all to be puréed).
mit: Artichokes, Brussels sprouts, cabbage, corn, cucumbers, lettuce, lima beans, onions, peppers, radishes, sauerkraut, scallions, tomatoes, turnips, watercress.
idden.

lcohol	Meats, fried	Highly spiced or seasoned foods
obacco	Pastries	Whole wheat products
axatives or cathartics	Shellfish	
	Nuts	

uggestions.—Introduction of other items may be made at the sician's discretion in response to the patient's desires. The cess of the treatment often depends upon the expertness shown he preparation of the diet. Wherever necessary, then, the doc must be prepared to give detailed instruction in this regard. vide knowledge of foods and their processing is the best possible ipment for this task.

CONSTIPATION

Jerome Marks, M. D.

'onstipation exists when an individual does not spontaneously cuate the bowel at least once in twenty-four hours. Such a daily vement is generally accepted as normal, although wide variation y exist, with evacuations occurring only every third or fourth or at even longer intervals, without any impairment of wellng. However, for the majority of persons a daily movement is parently necessary for comfort and health and should be the aim herapy.

The *causes* of constipation are numerous, and frequently m
may be active simultaneously in the same individual.

These include among others, anomalies of the colon (redundar
body habitus (especially the asthenic); psychic and nervous fac
vicious habit formation; endocrine factors (hypothyrodism)[6];
finally, dietary factors. The latter are among the most impor
and involve: (a.) inadequate bulk in the diet, (b.) inadeq
vitamin intake[2], (c.) mineral deficiency (calcium and potas
salts,[11] (d.) irregular food habits, (e.) insufficiently stimula
foods (natural catharic salts, acids and sugars of fruits), (f.)
sufficient water drinking.

All these factors will be discussed in some detail below.

Varieties of Constipation.—I. *Atonic Constipation* occurs w
there is a relaxation of the bowel musculature in asthenic or m
nourished individuals, or it may develop from long contin
use of enemas or cathartics. Alvarez *et al*[1]. claim this form to
only a secondary result to distal spastic constipation but stu
after opaque enemas (Larimore[10], Kantor[8]) actually show "
composition" of the colon.

II. *Spastic Constipation*, the most common type, is often as
ciated with left lower quadrant pain, and a palpable tender d
scending (iliac) colon. Spasm in this type is also often noted at t
anal sphincter.

III. About 20 per cent of cases reveal *rectal constipation (d
schezia)* with normal transit through the colon but accumulati
and impaction of feces in the rectum. This type results fro
failure to respond to the call for defecation, from painful ano-rect
disease, (Hurst[7]), and not infrequently in bedridden older patient
a matter of importance in our new interest in Geriatrics. Diet h
little effect on this type, the principle therapy being correction
predisposing ano-rectal disease, correction of faulty stool habi
and the use of suppositories, low enemas or oil instillations.

IV. Finally, there is the constipation associated with *redunda
colon* which accounts for about 20 per cent of cases. Because of th
length and consequent looping of the colon, stools in this type ma
occur only at long intervals, and these patients give the characte
istic history that enemas usually are of little use and often g
"lost" in the abdomen[8].

Though it is helpful to describe four distinct types, it is freel
admitted that "pure" forms seldom are encountered in practic
several varieties may occur in the same individual. Thus spas
of the distal colon produces an atony of the proximal colon; spas
likewise is frequently associated with redundancy, and also ofte
results from the same painful ano-rectal lesions that give rise t
dyschezia. For rational therapy it is thus of paramount impo
tance not only to diagnose the existence of constipation but to eva
uate the various elements (spasticity, atonicity, redundancy) whic
may exist in each case. The ideal method is detailed *x*-ray studie
but a practical clinical diagnosis can usually be made. This involve
careful history taking, a physical examination to reveal the presenc

lonic spasm and/or atony, a rectal examination for local disease for determining rectal packing, and finally actual inspection of stool itself. *It must again be stressed that no case of constipation ld ever be treated without a complete rectal examination.*

reatment.—"Constipation is one of the most frequent litions which the physician is called upon to treat, yet there is ably no other common disorder which is so often badly managed. is unfortunate since the results of adequate treatment are lly satisfactory" (Bockus[3]).

reatment consists of two parts: namely hygienic measures and appropriate diet, both of which require individualization. ng the more important *hygienic measures* may be mentioned:

.) Explanation of colonic physiology to the patient, stressing importance of regularity of habits, so that he will make every rt to move his bowels every day at a set time. This is usually t easily accomplished just after breakfast when the accumulated nic content responds best to the gastro-colic reflex.

2.) Avoidance of laxatives and enemas, coupled with the assur- e that failure to have a daily movement during the period of ection will have no serious consequences whatsoever, except haps discomfort (which at best is most probably psychological tion).

3.) Relaxation in general, and in particular during the time set le for the daily visit to stool. This may be accomplished by wing adequate time, "appropriate literature", and for those om it relaxes, a morning smoke.

4.) Reassurance that normal bowel function can almost always established (unless the patient is too old) with perserverance, peration, and willingness of the patient to undergo some slight comfort during the period of treatment.

Equally important perhaps even more than hygienic measures, is proper *dietary regimen*. This too must be individualized and nned with the same precision as a diet for diabetes or obesity[9]. e principles underlying a diet prescription may be considered ler the following heads:

1.) **Adequate Bulk.**—This aspect of the problem has recently n studied by Cowgill[5,6] who advocated a fiber minimum of 90 to mg. fiber per kilogram of body weight. Kantor and Cooper[9] e enlarged this study and recommended the addition of 20 small nes, 3 bananas, or 2 apples to the usual servings of vegetables l cereals to supply the Cowgill fiber requirement. The "usual" vings include daily four vegetables one of which may be potato, whole grained cereal, and at least one slice of whole wheat ad in addition to other bread. Obviously substitution of fruits, etables, cereals and bread stuffs are allowed according to the les of Kantor and Cooper (See page 720).

t is advisable, however, that at the beginning of treatment only nd articles should be used, because rough food-stuffs may provoke vel irritation with resulting spasm and, so, increase constipation.

As a practical matter, therefore, the use of bananas (high in content and relatively non-irritating) is recommended. In dition, fruits and vegetables should be well-cooked and pure first which renders them less irritating without reducing their Bulk (as distinct from roughage which it is wise to avoid) may be obtained through the use of accessory food substances such a hydrophilic colloids, (agar-agar, bassorin, psyllium, Karaya, other mucilagenous vegetable substances) which by absorl water swell in the bowel and thus give the necessary stimulu peristalsis without producing the irritative effects of the "rougha foods on the colon (bran, raw fruits, etc.). In general, there unless spasm can be completely excluded by history and phy examination it will be wisest to begin the dietary managemen constipation by use of a "bland" diet with bulk supplements. A the treatment is under way and irritability has subsided, the may be gradually expanded cautiously to include salads, raw ve tables, and raw and dried fruits.

The use of the hydrophilic colloids is often of great value treating the rectal type of constipation (dyschezia) where the bul stool produced tends to intensify the lost defecation reflex; a similarly they are of value in constipation due to redundant col where the long capacious bowel is filled by a large, semi-solid ma and a normal stimulus to peristalsis is thus supplied.

(2.) **Adequate Vitamin Intake.**—Experimental work on anima by numerous observers[2] has indicated that deficiency of Vitamin B and/or pantothenic acid and probably other factors of the B Compl causes loss of intestinal tone and decreased intestinal motilit Studies in humans tend to confirm these findings, but their eva uation is not always easy, since some of the beneficial effects ma have resulted from the bulky preparations used as a source vitamin B. Nonetheless, our diet being at best deficient in the elements their addition seems indicated. Hence Brewer's Yeas pork (if tolerated), and other meats, as well as unimpaired cereal deserve to be included in the diet. Supplemental feedings of whea germ and the various commercial forms of vitamin B may be use A heaping teaspoonful of Brewer's Yeast may be suspended in small amount of water, then diluted with tomato, orange, grap fruit or pineapple juice to a volume of 100 to 150 cc., so that a optimum intake of vitamin C is provided as well.

(3.) **Adequate Mineral Intake.**—Importance of mineral metaboli can be appreciated from the work of Robertson and Doyle[11]. The experimenters showed that rats fed on mineral poor diets so develop marked intestinal stasis, which was promptly relieved wh calcium and potassium carbonate were added to the diet. Th stasis did not occur in control animals on normal mineral die Minerals in general, and potassium salts, in particular, in the huma dietary are to a great extent lost by the boiling of foods. The u of large amounts of sodium chloride serves further to deprive t body of potassium. In our dietetic regimen therefore, table sa should not be used in excess and potassium-containing foods shou

onsumed wherever possible (See list on page 209). When s foods contain too much roughage for an irritable colon, their s may be advantageously substituted.

lcium is of course best obtained from milk and its products. in popular belief is held to be constipating, but this is probably o the fact that patients taking it in large quantities do so at the nse of other foods more likely to give greater bulk to the stool. is a valuable food and unless there is some good reason (allergy) s omission, it deserves inclusion in the diet.

) **Chemical Stimulation of Peristalsis.**— Fruits, both fresh and l, contain numerous organic acids, salts, and sugars that are ly laxative. These include figs, raisins, prunes, dates, pears, es, oranges, melons, and grapes. Hence, they should have a lar part in the diet; or if they are too irritating to the intestine ld be given as juices (apple, orange, prune or grape), or stewed. ry palatable dish may be prepared by cooking figs, raisins and es, adding this mixture to cereal. Prunes are especially val-e and as has been pointed out probably owe their laxative effect n isatin compound similar to commercial "isacen".

.) **Adequate Fluids.**—Many causes of constipation are due to ther factor than the consumption of a highly concentrated dry A glass or two of water before each meal may be all that is ssary for a cure. In constipation due to colonic spasm, redun-cy, or rectal packing, lack of adequate fecal liquefaction is an ciated element in aggravating the disease. Marked amelior-n occurs when sufficient fluid is taken. This should amount to east $1\frac{1}{2}$ liters daily in addition to the moisture present in the l food. From a physiological standpoint, fluid taken on an ty stomach before breakfast rapidly passes through the digestive t, acting as an intestinal flush and stimulant to colonic peri-sis and so two glasses should be taken at this time. An additional s should be taken before lunch and before supper. Patients ld be warned *not* to add lemon juice to the pre-breakfast water t has recently been shown[12] that this practice may be very ructive to the enamel of the teeth.

.) **Miscellaneous Dietary Factors.**—Honey is generally considered tive as is also milk-sugar. Both of these may be used to advan-, especially if the patient is underweight. *Fats* promote peri-sis, chemically and mechanically, and therefore the addition of er, cream, olive oil (pure or as mayonnaise) and bacon is recom-ded particularly to the asthenic patient unless so-called "bil-ness" results. A high fat dietary is appended.

lcohol in limited quantities is not detrimental to evacuation in e who do not have an idiosyncracy to stimulants, and for those enjoy it, beer is said to be mildly laxative.

BLAND DIET FOR SPASTIC CONSTIPATION

(First Stage of Treatment)

ORE BREAKFAST:

2 glasses of plain tap water.

BREAKFAST:

Fruit:—

Fruit Juice (orange, grapefruit, pineapple, or prune).
Vegetable Juice (tomato, V-8, etc.).
Stewed or canned fruit (pears, prunes, cherries, pea apricots, apples, apple sauce). AVOID ALL BERRIES.
Bananas.

Eggs:—

Soft boiled or poached.

Cereal:—

Strained oatmeal, cream of wheat, farina, hominy, cornfl or puffed rice, (with milk or cream and a little sugar. M sugar is preferable). AVOID BRAN.

Bread:—

White Bread (plain or toasted) with butter or honey.

Beverages:—

Sanka coffee (cream and sugar as desired). Milk. T Postum.

10 *A. M.:*

Toast, Holland Rusk, Zwiebach, Uneeda Biscuit (with butt or honey).
Malted Milk, Milk, or Fruit Juice (same as breakfast—addi heaping teaspoonful of yeast).

DINNER:

Soups:—

Creamed, preferably, or pureed vegetable (peas, potato, etc.

Meats:—

Chicken; Lamb chop; Roast Lamb; Tender Beef Steak; Roas Beef; Plain Boiled Ham; Broiled Calves Liver.
Fresh Fish (boiled, broiled or baked).
Canned Tuna fish or Salmon.

Vegetables:—

Baked, boiled or mashed potatoes. Rice, macaroni, spaghett vermicelli, or noodles (with butter added at the table).
String beans, peas, small lima beans, squash, beets, aspara gus tips, carrots, spinach. ALL PUREED.

Desserts:—

Plain desserts—Rice, tapioca, farina, bread or chocolat pudding. Custard, junket or plain jello with cream. Prun whip. Plain pound cake, sponge cake, angel food or Lad Fingers. Ice Cream (if melted in the mouth). Cream chees or pot cheese. Baked apple (without skin); apple sauce bananas; stewed fruit (same as breakfast).

Beverages:—

Same as breakfast.

4 *P. M.:*

Same as 10 A. M. (if desired).

SUPPER:

Same as Breakfast or Dinner.

10 *P. M.:*

Same as 10 A. M. (if desired).

Avoid

verything fried or rich in fat, including gravies.
verything highly spiced or seasoned (mustard, pepper, vinegar, hup, horse-radish, relishes, prepared meat sauces). Salt is wed, in moderation.
ll canned, smoked, and preserved meats and fish.
ll raw and dried fruits and raw vegetables.
ll pastries, preserves, nuts, and candies.
ll stimulants and carbonated waters.
ll ice cold beverages.
OTE: At least 6 and preferably 8 glasses of water daily.

DIET FOR CONSTIPATION

ond Stage of Treatment when colonic spasm has subsided)
Standard BLAND Diet with the following additions:
it: May be eaten raw or dried (figs, dates, prunes).
ereals: May include whole grain cereals.
read: Whole wheat or rye.
egetable: Cooked or raw. NOT PUREED.
essert: Include fruits as noted above.
luids: At least 6 to 8 glasses of water daily.
OTE: The transition from the BLAND diet to this full diet ld be a slow progression. Many persons will not be able to rate all the foods listed above without developing distress, and offending articles withdrawn as soon as discovered.

REFERENCES

. Alvarez, W. C. *et. al.* Hypertension and Constipation. Arch. Int. Med. **38**, 158, 1936.
. Bicknell, F. and Prescott, F. The Vitamins in Medicine, London, Wm. Heinemann, 1947. Pp. 226 et. seq.; pp. 264-6; pg. 119.
. Bockus, H. L. Gastro-enterology, Philadelphia, W. B. Saunders Co., 1944 Vol. II, pg. 521.
. Brown, T. R. Hypothyroidism as a cause of Intractable Constipation. JAMA **86**, 1937, 1926.
. Cowgill, G. R. and Anderson, W. E. Laxative Effects of Wheat Bran and "Washed Bran". JAMA **98**, 1866, (May 28) 1932.
. Cowgill, G. R. and Sullivan, A. J. Further Studies on the Use of Wheat Bran as a Laxative. JAMA **100**, 795 (Mar. 18) 1933.
. Hurst, A. F. Constipation and Allied Intestinal Disorders, London, Oxford University Press, 1919.
. Kantor, J. L. In Portis' Diseases of the Digestive System, Philadelphia, Lea and Febiger, 1941.
. Kantor, J. L. and Cooper, L. F. Ann Int. Med. **10**, 965 (Jan.) 1937.
. Larimore, J. W. The Human Large Intestine in the Newborn and in the Adult. Ann. Clin. Med. **5**, 439, 1926.
. Robertson, E. C. and Doyle, M. E. Intestinal Stasis on Low Mineral Diets. J. Nutrition, **9**, 553, 1935.
. Stafne, E. C. and Lovestedt, S. A. Dissolution of Substance of Teeth by Lemon Juice. Proc. Staff Meetings Mayo Clinic **22**, 81 (Mar. 5) 1947.

CORONARY THROMBOSIS

Robert McGrath, M. D.

or the first three days after the onset of the attack, a diet of ds and soft foods should be ordered. For most cases the usual

type of soft diet is satisfactory for this period but occasionall more restricted diet such as the following is best for the first da

Morning: Strained fruit juice.

Midmorning: Gruel with cream and sugar.

Midafternoon: Eggnog.

Evening: Soft cooked egg; ice cream or gelatin.

Late evening: Milk or buttermilk.

After the third day the soft diet can be replaced by a 1200 cal low residue diet. For most patients not requiring weight reducti the latter is satisfactory for the remainder of the period of bed r Some patients dislike a low residue diet and for them a 1000 calo diet of the weight reduction type may be used beginning at tenth day, provided that the uncooked fruit and coarse vegetal included do not disturb the digestion.

When weight reduction is needed, an 800 calorie weight reducti diet should be ordered beginning at the tenth day. This diet w disturb the digestion of certain patients for the reason just me tioned. For such patients the following plan is satisfactory bo from the standpoint of the gastrointestinal tract and weight duction. Use the 1200 calorie low residue diet and the Karrell d on alternate days.

The preceding discussion has been planned for the case followi an average course. The diets referred to will be found in this bo under appropriate headings.

In addition to its value in weight control, a low caloric intake h been shown to diminish the work of the heart by reducing the bas metabolic rate. The emphasis placed on a diet that does not distu the digestion is based upon the fact that coronary vasoconstricti is produced by viscerocardiac reflexes resulting from indigestio Discussion of this point will be found under Angina Pectoris.

If congestive failure is present, the dietary management shou be the same as outlined in this book under Myocardial Failur consisting essentially of a low sodium neutral ash diet.

Maintenance Period.—For the low-calorie diets (600 to 1000 Ca suitable at this stage of the disease, reference should be made Obesity (page 467).

CYCLIC VOMITING.

Vincent Larkin, M.D.

Discussion.—Cyclic vomiting is characterized by periodic attac of vomiting which occur at regular intervals without appare cause but which at times may follow excitement or fatigue. Th condition has been reported in infancy, but is more prevalent children between the ages of two and four and often persists un ten or twelve. Children so afflicted are usually high-strung, nervo and delicate. The attacks last from several hours to several da and are accompanied by periods of lassitude and anorexia.

The author believes that the vomiting is attributable to a gener metabolic derangement and not to the acetone body disturban

TABLE 27. 1500 CALORIE LOW SODIUM NEUTRAL ASH SOFT DIET.

Food	Amt. in Grams	Household Measure	C	P	F	Na	Base	Acid	Neutral
Breakfast									
Orange juice	100	2 cup	12	–	–	.0002	4.8	–	–
Farina	30	4 c. cooked	16	2	–	.0195	–	–	–
Toast (Low salt)	30	1 slice	15	3	–	.0230	–	2 2	–
Butter (salt free)	5	1 tsp.	–	–	4	.0002	–	–	+
Light Cream	30	2 tblsp.	1	1	6	.0390	1.2	–	+
Milk (whole)	50	1 cup	3	1	2	.0255	–	–	–
Beverage	10	2 tsp.	10	–	–	–	–	–	+
Sugar									
Dinner									
White Meat Chicken	50	1 slice	–	10	2	.0390	–	5 4	–
Rice	30	4 c. cooked	24	3	–	.0005	–	2 8	–
Peas	100	2 cup	9	2	–	.0009	.9	–	–
White Bread (low salt)	30	1 slice	15	3	–	.0230	–	2 2	–
Butter (salt free)	10	2 tsp.	–	–	8	.0004	–	–	+
Orange Ice	100	2 cup	35	–	–	.0002	2 8	–	–
Milk (whole)	180	1 glass	10	6	8	.1020	3 7	–	–
Sugar	5	1 teaspoon	5						
Supper or Lunch									
Egg omelet	48	1 egg	–	6	6	.0628	–	5 5	–
Asparagus tips	100	5 stalks	3	1	–	.0160	5	–	–
White bread (low salt)	30	1 slice	15	3	–	.0230	–	2 2	–
Butter (salt free)	10	2 tsp.	–	–	8	.0004	–	–	+
Apple Sauce	100	2 cup	20	1	–	.0001	2 4	–	–
Milk (whole)	180	1 glass	10	6	8	.1020	3.7	–	–
Sugar	5	1 teaspoon	5						
		Totals	207	48	52	.4777	20.0	20 3	–

TABLE 28.—1000 CALORIE LOW SODIUM NEUTRAL ASH DIET.

Food	Amt. in Grams	Household Measure	C	P	F	Na	Base	Acid	Neutral
Breakfast									
Orange juice	100	2 cup	12	–	–	.0002	4.8	–	–
Egg	48	1 egg	–	6	6	.0628	–	5.5	–
White toast (low salt)	30	1 slice	15	3	–	.0230	–	2.2	–
Butter (salt free)	3	2 tsp.	–	–	2	.0001	–	–	+
Beverage–Sk. Milk	30	2 tblsp.	1	1	–	.0127	.6	–	–
Dinner									
Roast Beef (lean)	75	1 serving	–	15	10	.0396	–	5.6	–
Summer squash	100	2 cup	3	1	–	.0005	1.1	–	–
String beans	100	2 cup	3	1	–	.0230	5.5	–	–
White bread (low salt)	30	1 slice	15	3	–	.0230	–	2.2	–
Butter (salt free)	5	1 tsp.	–	–	4	.0002	–	–	+
Apple Sauce (no sugar)	100	2 cup	12	1	–	.0001	2.4	–	–
Skimmed milk	180	1 glass	10	6	–	.1020	3.3	–	–
Supper or Lunch									
Sliced chicken	75	1 serving	–	15	3	.0585	–	8.1	–
Peas	100	2 cup	9	1	–	.0009	.9	–	–
Sliced tomato-lettuce	100	1 med. tomato and 1 leaf lettuce	3	1	–	.0042	5.7	–	–
White bread (low salt)	30	1 slice	15	3	–	.0230	–	2.2	–
Butter (salt free)	5	1 tsp.	–	–	4	.0002	–	–	+
Blueberries (fresh)	100	⅔ cup	12	1	–	.0005	2.7	–	–
Skimmed milk	180	1 glass	10	6	–	.1020	3.3	–	–
Beverage		1 cup							
		Totals	120	64	29	.4765	30.3	25.8	[illegible]

Food	Amt. in Grams	Household Measure	C	P	F	Na	Base	Acid	Neutral
Breakfast									
Orange juice	100	2 cup	12	–	–	.0002	4.8	–	–
Oatmeal	20	4 cup	16	2	–	.0006	–	3.2	–
Egg	48	1 egg	–	6	6	.0628	–	5.5	–
Toast (low salt)	30	1 slice	15	3	–	.0230	–	2.2	–
Butter (salt free)	5	1 tsp.	–	–	4	.0002	–	–	+
Milk (whole)	50	1 cup	3	1	2	.0255	1.2	–	–
Sugar	15	1 tsp.	15	–	–	–	–	–	+
Light cream	30	2 tblsps.	1	1	6	.0390	–	–	+
Beverage									
Dinner									
Roast Beef	100	1 lg. serving	–	20	15	.0530	–	9.6	–
Baked potato	100	1 med.	18	3	–	.0006	9.0	–	–
Summer squash	100	2 cup	3	1	–	.0005	1.1	–	–
Sliced tomato & lettuce	100	1 tomato & lettuce	3	1	–	.0042	5.7	–	–
Bread (low salt)	30	1 slice	15	3	–	.0230	–	2.2	–
Butter (salt free)	10	2 tsp.	–	–	8	.0004	–	–	+
Lemon Gelatine	85	2 cup	18	2	–	.0008	.3	–	–
Sugar	5	1 tsp.	5	–	–	–	–	–	+
Milk (whole)	180	1 glass	10	6	8	.1020	3.7	–	–
Supper or Lunch									
Sliced chicken	75	1 serving	–	15	3	.0585	–	8.2	–
Steamed rice	30	4 cup cooked	24	3	–	.0005	–	2.8	–
Asparagus	100	5 stalks	3	1	–	.0160	.5	–	–
White bread (low salt)	30	1 slice	15	3	–	.0230	–	2.2	–
Butter (salt free)	10	2 tsp.	–	–	8	.0004	–	–	+
Canned peadhes	100	2 halves	18	1	–	.0001	4.7	–	–
Sugar	5	1 tsp.	5	–	–	–	–	–	+
Milk (whole)	180	1 glass	10	6	8	.1020	3.7	–	–
		Totals	209	78	68	.5363	34.7	35.9	

which is present, as children with more severe acidosis than accompanying cyclic vomiting may not vomit. This metal derangement may probably be of nervous origin. Acetone bo are frequently found in large amounts in the urine and at time demonstrable within a short period after the onset. Their accu lation, however, does not explain the vomiting.

Small quantities of food readily evoke vomiting, and even in absence of food, vomitus is produced consisting of gastric ju mucus and occasionally blood and bile. The breath is usually and masks the odor of acetone which would otherwise be found.

Treatment is principally dietetic and requires little medicat Early in the disease, an initial short period of starvation is indica followed by carbohydrate administration, which may be augmen by orange juice and alkaline waters. Fluids should be given fre but if vomited, may be injected parenterally. After recove those foods high in carbohydrate and low in fat should constit the major portion of the diet. When milk is resumed, it sho first be skimmed and diluted.

Lolly-pops or other hard candy at midmorning and midaftern provide a satisfactory source of readily available carbohydrate.

CYSTITIS.

(Refer to page 570.)

DERMATOLOGIC LESIONS.

Samuel Ayres, Jr., M.D.

Introduction.—Curiously enough that field of medicine in whic the sites of the disease are most accessible, namely, dermatolog offers some of the most baffling etiologic problems. Rational dietet treatment is consequently difficult to institute. One reason for th paradox is the fact that in many instances the skin manifestatio do not constitute the disease but represent some functional or organ disorders. Like brightly colored beads held before the eyes of savage, the gaudy skin eruption is too often likely to distract o from the realities of the situation. Too much attention is oft focussed on the cutaneous picture and too little on the underlyi pathologic changes which have produced the condition.

It is difficult dogmatically to exclude any skin disease from th possibility of being influenced by diet except, perhaps, the congenit anomalies, such as hemangiomas, pigmented nævi, fibromas, an such acute infections as impetigo, scabies, erysipelas, etc. O might even argue that with an entirely proper diet the resistan would be maintained in such an excellent state that acute infectio would be unlikely to occur. With the present state of our knowledg such a statement can be neither proved nor disproved.

Diet may also play a rôle in dermatology through indirect mean For example, an improperly balanced diet may induce a susce tibility to infections of the teeth, tonsils, sinuses or other area leading to the establishment of a focus of infection which may th

ice skin eruptions through toxic effects. The influence of diet e development of cancer is also a matter of much debate, and which is undergoing extensive investigation.

normal, balanced diet as described elsewhere in this book is a safe guide for most of the skin conditions. Alcohol is deleus in the majority of eruptions because of the fact that many atoses are inflammatory in nature, that is, are characterized dilation of the cutaneous bloodvessels. Since one of the promeffects of alcohol is a flushing and warmth of the skin, the ion is usually aggravated. Tobacco may influence nutrition ariety of ways through its effect on digestive functions, its tendto slow down capillary circulation and by means of allergic or direct toxic effects. Skin disorders associated with a reduction erial supply are probably very definitely harmed by smoking. idt has indicated that smoking is detrimental in cases of lupus ematosus.

r practical purposes, dietary instructions are specifically val- in only few skin diseases, of which the following are probably nost important.

ne Rosacea.—Discussion.—At least two distinct causes may ice this disorder. It has recently been recognized that some are due entirely to the infestation with a minute animal para- Demodex folliculorum. This organism has been known for a time as a frequent inhabitant of the sebaceous gland duct, espe- about the nose and face of adults, apparently harmless in its of scavenger. In some cases of acne rosacea, however, these ites can be found in large numbers in the superficial follicular or vesico-pustules which occasionally may be seen. The r has personally counted as many as sixteen organisms in a , tiny scale or droplet of pus. This parasite is usually not l in acne vulgaris. Cases of rosacea in which Demodex follicm is found usually clear up promptly under the local applin of a strong antiparasitic ointment, such as one might use bies.

ner cases of rosacea, clinically indistinguishable from the itic type, are commonly caused by gastro-intestinal disturb- , most frequently by a hypochlorhydria or an actual achylia ca. When such an etiology can be demonstrated, the response hypochlorhydria diet and dilute hydrochloric acid by mouth st gratifying. The details of such a diet may be found by nce to Gastric Hypoacidity.

i of infection, utero-ovarian disturbances and emotional es have also been credited with producing the clinical picture ne rosacea. Deficiency of vitamin B complex has been cond by some authorities as a contributing factor in certain cases.

ggestions. When meats are prescribed they should not be too lone. Those of choice are beef, lamb or liver. They should nder and taken in modest amounts. Any food which causes ss because of idiosyncrasy on the part of the patient should

be avoided. There is an intimate reflex connection between stomach and the vascular supply of the face. The mere takin food into the stomach tends, in many cases, to cause flushin the central portion of the face. In the presence of rosacea, tendency to flushing is greatly exaggerated. Alcohol even in min quantities is the greatest offender. Iced or excessively hot dri such as hot soup and highly seasoned foods also produce facial c gestion. Food should be eaten slowly, drinks should be sipped a in the presence of a low gastric acidity, dilute hydrochloric aci water should be sipped along with each meal. The amount roughage in the diet will depend upon the condition of the stom and intestines of the individual case.

Acne Vulgaris.—Discussion.—The cause of acne vulgaris is t fold. The underlying basis for its development is an oily sk Since the endocrine changes which are characteristic of adolesce stimulate the oil glands, most cases of this disorder are seen betw the ages of twelve and twenty years, although a few cases have b reported in infants and the disease occasionally persists into adult period of life. Certain bacteria, especially the staphylococ and the acne bacillus, find the oily skin with its comedones an ex lent culture medium and are responsible for the papules, pustu and subsequent scarring. Since, at the present time, there are known measures for controlling the excessive oil secretion throu internal channels, the most effective method of treating the disea is by external means. For mild cases, antiseptic and astringe lotions suffice, but for severe cases, properly administered fraction doses of Roentgen-ray have the power of restoring the oil glan to a normal state of function, thereby depriving the bacteria of the source of food supply. Excellent results can be obtained by th means alone. Maynard had treated 132 cases of acne vulga with vitamin D in the form of *Viosterol* (20 to 40 drops daily) a after three months noted that 28.5 per cent were markedly improv and 47.1 per cent were healed. This work has not been altogeth confirmed as yet. Sutton believes that acne should be treated by diet low in fat, low in vitamin A, milk-free and augmented by th roid and iodized salt. This work has not been confirmed by oth dermatologists. In contrast with this theory, a number of recei observations indicate marked benefit from large doses of vitamin such as 150,000 units daily. It is felt that the lamellar hype keratosis about the mouths of the follicles is due to a temporary relative deficiency of vitamin A possibly brought on by hormo activity.

Focal infections in the sinuses, tonsils, teeth, etc., pulmona tuberculosis, improper or defective alimentation and any system condition which lowers the general resistance are important co tributory factors in certain cases. Where anemia is present, t diet should be planned accordingly (see Secondary Anemia a Chlorosis), and where a lack of gastric acidity has been found, occasionally happens, the diet should be concerned primarily wi this factor. (See Gastric Hypoacidity.) Acne tends to becon

rely exacerbated in the presence of heat and humidity as was ely demonstrated during the recent war. Perhaps an abnormal sitization of the tissues to the infecting organisms may account part for the sudden transformation of a relatively mild case of e to one with deep inflammatory cyst-like abscesses with severe rring, the so-called acne conglobata, which during the war was med "tropical acne". The two conditions are in all probability ntical.

n general a few dietetic rules may be helpful.

it.

lcoholic drinks, chocolate, nuts, soda fountain drinks except unsweetened fruit juices

astry, pie, cake, ice-cream, fried foods, cream in any form, jams, jellies, marmalades, etc., iodized salt (see p. 288)

nit.

ats, sugar, meats, potatoes, bread, rice, macaroni, noodles, spaghetti

Typical Menu.

akfast:

ruit
Vhole grain cereal, cooked *or* prepared, with milk
Vhole grain toast *or* roll thinly buttered
Iilk

ncheon:

gg, except fried *or* cottage cheese
ooked vegetables
alad with lemon juice
Vhole grain crackers
resh *or* stewed fruit
Iilk

nner:

ruit juice *or* vegetable juice
ean meat *or* fish
ooked vegetable, other than potatoes
alad with lemon juice
Vhole grain bread thinly buttered
resh *or* stewed fruit
Iilk

uggestions.—The diet should consist principally of vegetables, its, milk, eggs in moderation, meat not more than once a day ess engaged in active physical exercise. Restriction of carbohyte has been more or less a traditional procedure in acne vulgaris. ent investigations by Crawford and Schwartz at Harvard, howr, tend to discredit the idea that starches and sugars are harmful. asionally hot bread may be permitted, if thin and crusty. eals may be eaten two or three times a week. Fats in the form outter and cream may be used in moderation, but ice-cream, pped cream, gravy and fried foods are likely to be troublesome. abundance of water should be consumed. Since iodides and

bromides are partly excreted by way of the sebaceous glands, food or drugs containing these substances should be used. This includes iodized salt, Bromo-quinine, Bromo-seltzer, bromides, etc. Needless to say, the bowels should be regulated so as to produce one or two adequate movements a day.

In the event additional natural roughage is indicated, the following foods are particularly recommended and can be infiltrated into the preceding diets: Baked beans, corn, dates, figs, grapes, pears, plums, prunes, raspberries, wheat, bran and barley. Additional items of foods with high roughage may be found elsewhere. The administration of agar-agar may, if necessary, be judiciously prescribed without interference with the dietary regimen.

Acrodynia.—Discussion.—This is an uncommon disorder occurring in infants characterized by a pink or red color of the hands and feet which are at the same time rather cold and accompanied by a more or less generalized papular eruption with hyperhidrosis, photophobia and paræsthesias. Thiamine chloride by intramuscular injection has given good results according to a number of observers.

"Canker Sores" (Aphthous Stomatitis, Herpes Buccalis).—Discussion.—Much confusion exists with regard to the etiology of this condition. In fact the classification itself is unsettled, most authorities regarding the above titles as synonymous, while a few would distinguish between aphthous stomatitis and herpes of the buccal mucosa. With its rapid evolution, frequent recurrence, its superficial pin-head to pea-sized ulceration occurring singly or in a small group, (with a bright red areola and frequent submental lymphadenitis), the clinical appearance of the typical canker sore is familiar.

The consensus of opinion at the present time places canker sores in the same category as herpes simplex with a virus etiology. Apparently the virus becomes fixed in the tissues and may remain quiescent for long periods with recurrent attacks. Such attacks may occur spontaneously, or as the result of various disturbances of digestion or other unknown factors.

Certain food idiosyncrasies, especially a sensitivity to walnuts may act as a trigger mechanism in a susceptible person.

In addition to avoiding foods known to precipitate attacks, marked benefit may result from a series of intradermal injections of smallpox vaccine given in a dose of one to two capillary ampules at intervals of three or four days for 10 to 12 injections.

Attention has been called to some cases which were apparently benefited by feeding substances rich in water-soluble vitamin B, such as yeast, wheat germ, etc. Refer to Foods Highest in Vitamins.

Carbuncles, Furuncles, and Pyogenic Infections.—Discussion.—Chronic or recurring pus infections of the skin usually indicate a lowered resistance which may depend upon various factors such as diabetes, anemia, foci of infections, vitamin deficiencies, overwork, fatigue, etc. In addition to correcting such defects as enumerated above with dietary management appropriate to

circumstances, the author has obtained excellent results from use of autogenous vaccines prepared without phenol, and ministered intravenously at weekly intervals for 10 to 15 doses. beginning dose should not exceed 25 million bacteria if staphylo-i are obtained or $\frac{1}{4}$ million if streptococci are grown. The e can be increased each time short of producing unduly pro-nced reactions of chills or fever and preferably below the point such reactions.

arotinemia.—Discussion.—This rather uncommon disorder is racterized by a lemon or ochre-yellow discoloration of the skin. st marked on the face, palms and soles but at times involving the re cutaneous surface. The scleræ are never affected, which is ortant in differentiating this condition from jaundice. The nentation is caused by carotin, a yellow coloring matter found ecially in fruits and vegetables such as carrots, squash, oranges, npkins, turnips, parsnips, spinach, green and yellow beans, uce, and also in egg-yolk, chicken fat and milk. Carotin is a rocarbon (C, 40; H, 56), and is intimately associated with min A, being regarded as a precursor of vitamin A.

he clinical picture of carotinemia is produced only when carotin-taining foods form a predominating part of the diet. Many es have been reported among diabetics, or raw food faddists, ng to an increased consumption of vegetables. The yellow oloration occurs chiefly on exposed areas and it is felt that light increases the intensity of the pigment.

he treatment is entirely dietetic and consists in a restriction of ls rich in carotin. The pigment disappears usually within four ight weeks, but may persist for many months as in a recent case ler the writer's observation. (Refer also to page 56.)

it.

arrots, oranges, parsnips, pumpkins, spinach, squash, turnips

nit.

ll fresh vegetables, butter, eggs and chicken

uggestions.—As soon as the pigment has disappeared, the diet uld be amplified by an increase of fruits and vegetables but rots, squash and oranges should be omitted. Meat, fish, bread, eals and such fruits as apples, pears and grapes should consti-e the bulk of the diet during active treatment.

czema, Neurodermatitis.—Discussion.—In view of the fact that ema is merely the name given to a symptom or mode of re-ion of the skin to a variety of causes both internal and external, s obvious that no hard and fast rules can be laid down regarding t which would be suitable for all persons suffering from this order. Yet in many cases diet is of the utmost importance.

During the past few years there has been a tendency to divide ema into two groups: one retaining the name eczema or con-t dermatitis, and applied to those cases due to external irritants l exhibiting a more vesicular eruption; the other to be designated

neurodermatitis, and including those cases due to atopic al (Sulzberger). Actually the problem is not as simple as thi third category would have to be designated to include all various eczematous eruptions which are caused neither by a allergy nor by contact allergy, but are due to any one of m miscellaneous causes. While it is true that clinical differenti can often be made between these types, the state of our knowl is so incomplete and opinions of competent investigators ar conflicting that it seems inadvisable at the present to be too matic in the matter. The term neurodermatitis has been ap to those cases of eczema with chronic, thickened, itchy erupt frequently involving the face, bends of the elbows and knees, usually hypersensitive to some protein allergen, either food, po or epidermal. There are also cases of localized neuroderma in which one single area may be involved over a period of m years without any other disturbance in the health. The e relationship of this disorder to the so-called disseminated ne dermatitis and to eczema has not been definitely established.

The etiology of eczema is extremely complicated. Among more prominent causes may be mentioned hypersensitivenes allergy to foods, pollens, bacteria, fungi, plants, chemicals, Occasionally, carbohydrate intolerance is found, due to defect sugar metabolism as exhibited by a disturbed sugar tolerance t Urbach has demonstrated that some cases show a normal bl sugar tolerance curve but a disturbed skin sugar tolerance cu with retention of sugar in the skin. Also, excessively low bl sugar values may be found together with low blood-pressure a in these cases a deficiency of adrenal cortex hormone has been s gested. Again defective pancreatic digestion leading to intesti fermentation, together with various little understood alterati of the body chemistry, are at fault. Endocrine imbalance, p ticularly of the thyroid gland, has not infrequently been pro the sole etiologic factor. Bacterial hypersensitiveness deser special mention since it includes those eczemas due to chronic f of infections in the sinuses, tonsils, teeth, genito-urinary, bilia gastro-intestinal tract, etc. Some cases of eczema are apparen caused, directly or indirectly, by a gastric hypochlorhydria achylia. Anemia, hepatic insufficiency and emotional tensi should receive consideration. Some cases known as infecti eczematoid dermatitis are due to external bacterial infections.

It must not be forgotten that a great many cases of eczema a due to external irritants such as plants, cosmetics, chemicals, et encountered in occupations and at home. Medications used the treatment of a minor irritation may cause a severe exacerbati followed by a secondary toxic absorption with an eruption occurri in widely scattered areas, the so-called "id" reaction. A care history assisted by patch tests of suspected substances will of reveal the offending irritant. Excessive bathing especially duri the winter months and in elderly people with sensitive skins m lead to a generalized pruritus or eczematous eruption, known

itus Hiemalis. It not infrequently happens that a person who come in contact with a certain substance for a number of years out suffering any inconvenience, will suddenly develop an erance to this substance resulting in an attack of eczema. No quate explanation has ever been given for this sudden change he body chemistry has taken place, and such a change might lt from dietary factors. Thus recent experimental observations everal different men indicate that the degree of reaction of the to a given irritant can be greatly modified by the diet, a cereal rendering the skin more irritable and a vegetable one conferring rtain degree of immunity against irritants. Vitamin C has found to render the skin less sensitive to certain irritants. This been demonstrated both experimentally and clinically in cases ntolerance to arsphenamine. Comel has noted beneficial lts in eczema from the use of vitamin D and believes that its e is in "fixing" calcium in the skin. Vitamin B complex by th and crude liver extract intragluteally in a dose of 2 or 3 cc. e a week have given good results in some cases of eczema of ure origin.

ith such diverse causes no rational diet can be prescribed for tient with eczema until a careful history, general and special minations and laboratory studies have revealed the source of trouble. Excluding, for the moment, those cases due to hyper-itiveness to specific foods, one may prescribe a "composite" ma diet as a temporary measure for those in whom no specific se can be determined. Such a diet should include an abundance itamins, plenty of fruits, vegetables, milk, water, and a moder- amount of easily digested meat. Alcohol should be avoided as as excesses of sugar, starches and fats.

t.

lcoholic drinks, soda fountain drinks, fried foods, ice-cream, cream in any form, sugar, salt and cereals

it.

astry, jams, jellies, meats, potatoes, bread, pepper, condiments, macaroni, noodles, spaghetti, rice

OTE.—Butter should be used very sparingly. Wherever pos-, sugar should be omitted or added to the meal in minute quan-s. Sugar should be omitted in cooking and replaced by a sugar stitute when sweetening is desired.

ggestions.—In choosing fruits, avoid an excess of those of the s family. The citrate salts *in vitro* interfere with the proper tioning of the blood calcium. While it is believed that prac-ly all of the citric acid and citrate salts are changed in the ach, it is not absolutely certain that some may not enter the lation as such. In view of the fact that a proper amount of lable calcium is of utmost importance in the treatment of cer- types of eczema, it would seem wise to allow for this theoretical ideration. Cases in which a stool examination reveals starch

fermentation are benefited not only by restriction of starch int[illegible] but are materially helped by oral administration of some reli[illegible] pancreatic extract in enteric-coated tablets.

The Gerson-Sauerbruch-Herrmansdorfer diet as described un[illegible] Lupus Vulgaris has also been used with benefit in some cases [illegible] eczema or "neurodermatitis", probably through its dehydrat[illegible] action. "Equilibrated" salt such as "Titro salt," later called "T[illegible] salt" apparently gives results comparable to those obtained fr[illegible] the total exclusion of sodium chloride.

Test or "elimination" diets, which are so often employed [illegible] detecting foods to which a person may be sensitive in certain ca[illegible] of allergic eczema, are described in detail elsewhere. (Refer [illegible] Test Diets in Food Allergy.)

Dietary prescriptions in cases of eczema due to allergy, as det[illegible] mined by test diets or by skin tests, will obviously exclude all foo[illegible] to which a person has been found definitely sensitive.

An attack of eczema is not infrequently brought on by an acu[illegible] psychic upset or by a chronic psychic turmoil such as business anxie[illegible] or domestic conflicts. The dietary treatment in such cases will [illegible] favored by correction of these influences or by a change of surrounding[illegible]

Erythema Multiforme (Toxic Rash).—**Discussion.**—The variou[illegible] types of toxic erythema are probably related both to urticari[illegible] and to eczema, and the same remarks concerning etiology ar[illegible] applicable. Drug sensitivity probably manifests itself more fre[illegible] quently in erythema multiforme than in eczema. The occasiona[illegible] toxic reactions seen either early in pregnancy or just before or afte[illegible] childbirth are often of the erythema multiforme type. Foci o[illegible] infections are another recognized cause of erythema multiform[illegible] and recurrent herpes simplex has also been observed to act as [illegible] trigger mechanism in the production of erythema multiforme.

The dietary suggestions under urticaria apply equally well i[illegible] erythema multiforme.

Exfoliative Dermatitis.—**Discussion.**—Several causes may be re[illegible] sponsible for a more or less generalized exfoliative eruption[illegible] The classical picture is seen in acute arsenical dermatitis due t[illegible] sensitivity to one of the arsphenamines. Arsenic from othe[illegible] sources, such as arsenic spray residues on fruit or vegetables, etc[illegible] may produce the same picture. Sensitivity to the sulfonamides[illegible] gold, penicillin and other drugs may result in exfoliative dermatitis[illegible] Atopic eczema or neurodermatitis may become generalized. Psori[illegible] asis either spontaneously or as the result of unduly irritating loca[illegible] medication may develop into a generalized exfoliative dermatitis[illegible] Chronic lymphatic leukemia and Hodgkins's disease may be accom[illegible] panied by the picture of exfoliative dermatitis. Other cases def[illegible] etiologic classification.

Dietary measures therefore will necessarily depend somewhat o[illegible] the underlying factors. Most patients suffering from generalize[illegible] exfoliative dermatitis display a voracious appetite. This is prob[illegible] ably due to an excessive protein and mineral loss in the profusely desquamating scales. It would seem logical therefore to supply a[illegible]

ndance of proteins, minerals and sulfur. In cases due to arsenic, intravenous administration of sulfur in the form of sodium thio- fate in doses of 1 gram of 10 per cent solution at intervals of two three days, definitely hastens the elimination of arsenic as deter- ned by a series of Gutzeit tests on the urine. The administration sodium thiosulfate should be continued for four to six weeks or ger if necessary. More recently BAL ("British Anti-Lewisite") ninistered intramuscularly has proved of value in the treatment exfoliative dermatitis and other tissue injuries caused by arsenic, rcury, etc. Vitamin C and liver extract have also been found to of value in arsenical cases.

Tomlinson, in a very recent paper, has shown that some cases of oliative dermatitis may show a markedly elevated basal metabolic e and yet at the same time present a high blood cholesterol. In se cases the high BMR represents a false value due to increased n metabolism and such cases may be greatly benefited by ninistration of thyroid. Everett Lain reports good results from use of pyridoxine intravenously in a dose of 900 milligrams in tain cases of exfoliated dermatitis, especially following sulfo- nides.

Suggestions.—In case of proven or suspected arsenical origin, deciduous fruits, as well as tomatoes, should be peeled in order avoid traces of arsenical spray residues which might cause an cerbation of the eruption. Vegetables should be thoroughly shed and the outer leaves should be discarded. The diet should tain an abundance of proteins and Peters observed benefit from administration of cysteine hydrochloride 0.25 gm. intramuscu- ly and 1 gm. orally each day for several weeks.

Follicular Hyperkeratosis.—**Discussion.**—During recent years has been noted by a number of investigators that a variety clinical manifestations characterized by follicular hyperkeratosis e been benefited or cured by the administration of large doses 0,000 units or more daily) of vitamin A over a period of several nths. In many of these cases there were no other obvious dences of vitamin A deficiency. The dermatologic lesions ge from gooseflesh-like, horny papules, arising at the site of o-sebaceous orifices with a small projecting plug, to more in- mmatory types of lesions consisting of small papules resembling e, but without pus formation and not confined to strictly acne as. The former gooseflesh-like corneous lesions usually involve antero-lateral surfaces of the thighs, arms and buttocks. Other ilar eruptions which have been benefited by vitamin A include e cases of ichthyosis, Darier's disease, ichthyosiform erythro- ma, lichen spinulosis, keratosis pilaris, pityriasis rubra pilaris, iculitis decalvans, and brittleness and friability of the finger- ls. It should not be concluded, however, that all dermatoses nifesting hyperkeratosis are due to vitamin A deficiency. In- tigation of this field has not been under way long enough to tify extravagant claims. In some of these cases such as Darier's ase there may be a congenital disturbance in the ability to

convert carotene into vitamin A. Other cases such as the cla types of ichthyosis may be due to an anatomical defect of the sk Porokeratosis of Mibelli has shown good response to vitamin

Insect Bites.—Discussion.—Several reports during the p few years have shown that attacks by insects such as mosqui and fleas can be discouraged by the administration of large do 50 to 100 mg. 3 times daily by mouth of thiamine chloride. T vitamin apparently confers immunity by rendering the subj unpalatable to the insect. After several weeks the dosage c be reduced.

Glossitis.—Discussion.—A red or inflamed tongue frequen indicates a vitamin B deficiency involving one or more facto A purplish red or magenta color with some swelling and a smoo surface showing flattened or mushroom shaped papillæ sugge a riboflavin deficiency. Niacin deficiency (Pellagra) usually cau a bright red tongue which is smooth, sometimes swollen and atroph The tongue may present a similar appearance in pernicious anemia

"Geographical tongue", the cause of which is unknown prese well defined smooth red areas with whitish scalloped or circina borders. These areas slowly migrate over the tongue, leavi a normal appearance in its wake.

A non-descript irritation with a burning sensation may be du to irritation by metallic ions liberated as the result of an electr galvanic current between dental fillings of dissimilar metals whic create a difference of potential.

Irritation of the tongue and mucous membranes may resul from sensitivity to dentifrices, mouth washes, cough tablets, den tures, etc.

Certain drugs such as phenolphthalein may cause recurren "fixed" eruptions of the tongue. Refer also to "canker sores" or herpes buccalis and "thrush" under the heading of Moniliasis Leukoplakia and lichen planus of the tongue must be considered i differential diagnosis of tongue lesions. Pemphigus may be con fined to the tongue or mouth for weeks or months.

Leukoplakia.—Discussion.—Leukoplakia, the formation of whitis thickened areas involving the tongue and buccal mucosa, may b due to more than one cause. Many authorities believe that syphili predisposes to leukoplakia, although the majority of cases ar probably unrelated to syphilis. Smoking, oral sepsis, and possibl endocrine and other unknown factors account for certain cases. I has recently been shown, however, that one type of leukoplakia consisting of a diffuse atrophic appearance of the tongue associate with leukoplakic patches, responds very rapidly to the administratio of vitamin B in the form of yeast.

Lichen Urticatus, Acne Urticatus, Prurigo.—Discussion.—Th question could be debated whether these are three separate an distinct entities or whether they are variants of a single typ of disorder. The lesions in these conditions consist of intensel itchy papules with a strong tendency to excoriation, and in fac the excoriation may be such a prominent feature that the conditio

be regarded as simply "neurotic excoriations." The lesions uently involve the extensor aspects of the arms, legs and ocks but may be generalized. When the eruption involves usual acne areas but without comedones or pustules it is spoken s acne urticatus. Sometimes the papules are surmounted iny vesicles and some cases may resemble dermatitis herpetiis. Flea bites may be mistaken for lichen urticatus.

he condition probably has a multiple etiology, some cases g a manifestation of atopic allergy. Other cases may be due foci of infections, intestinal parasites, gastro-intestinal disances, with hypoacidity, abnormal intestinal flora, liver pathy, etc.

he treatment, dietetic and otherwise, requires careful study of individual case. Calcium intravenously, Hapamine subcuously and benadryl or pyribenzamine are often helpful.

ight Sensitivity, Photo-Sensitive Dermatoses.—Discussion.—sitivity to sunlight may be a factor in a number of dermatoses. ptions in cases of lupus erythematosus, erythema multiforme, ll pox and certain other conditions are definitely aggravated sunlight or ultra-violet light. Hydroa æstivale and xeroderma nentosum are highly light sensitive. Other patients, on the trary, may exhibit merely nondescript erythematous, papular eczematous reactions as the result of very slight exposures the sun.

he mechanism responsible for photo-sensitivity is poorly underod. Porphyrins have been found in the urine and stools in ne of these cases and some observers blame the abnormal porrins for the sensitivity while others claim that they are a result the sensitivity. Certain drugs such as the sulfonamides can uce a state of photosensitivity and also foci of infections may y a part. Possibly liver pathology is important.

rbach has described a syndrome represented by about a dozen es coming under his observation, consisting of light dermatosis, urbed liver function, abnormal intestinal bacteria and fecal phyria. Excellent results followed a diet free of animal protein no animal or vegetable fat but an abundance of carbohydrates. addition, cultures of B. acidophilus were taken by mouth accomied by 1 tablespoon of lactose at each dose. Small doses of ulin (10 units 3 times a day) after adequate amounts of carbolrates together with intramuscular injections of crude liver ract 3 cc. every second day completed the treatment.

upus Vulgaris.—Discussion.—Lupus vulgaris and other forms kin tuberculosis, as well as tuberculosis of bones and joints and asionally pulmonary tuberculosis, have been successfully treated dietetic measures as recommended by Gerson, Sauerbruch and rmansdorfer. The essential features of the diet consist in an usion of sodium chloride, a restriction of carbohydrate and pro- and a liberal allowance of vegetables, fruits, fats, and minerals er than salt. The diet as advocated by Herrmansdorfer is acidning as he believes an increase of acidity favors the tissue

defenses against infection, while Gerson's modification of th
places a greater restriction on proteins and causes an alkaline
tion. Inasmuch as excellent results, amounting to cures in
obstinate cases of lupus vulgaris, have been obtained with
diets, the acid-base features are apparently of less importance
the high-vitamin content and the restriction of sodium chlorid

The brilliant clinical results have outstripped the scientific
planation of the diet, but the authors feel that the usual consu
tion of sodium chloride is far in excess of actual needs and that
excess disturbs the mineral metabolism. They believe that
imbalance may be corrected by excluding sodium chloride
freely administering the other minerals in the form of vegeta
and fruits. Any salt substitute not containing the sodium rad
can be used to replace sodium chloride. More recent modificat
of the Gerson-Sauerbruch-Herrmansdorfer diet permit the us
Titro salt, later called Toti salt, an equilibrated salt contain
mixtures of calcium, magnesium and potassium, with lesse
amounts of sodium.

The percentages according to Nordmark Chemical Works, I
New York, N. Y. are as follows:

Sodium	32.51%	Chloride	52.63%
Calcium	1.42%	Lactate	3.79%
Magnesium	0.86%	Citrate	0.5%
Potassium	2.7%		

All foods which are pre-salted should be excluded from the di

Cod-liver oil is usually prescribed and some clinicians advi
generalized irradiation with ultra-violet light, although Gers
very emphatically states that, in his experience, patients impro
much more rapidly with the diet and cod-liver oil but without t
light treatments. Since two distinct diets have been developed
the treatment of lupus, one the "Gerson-Sauerbruch-Herrmansdorf
diet" and the other the "Gerson diet," and since good clinic
results have been claimed for each, both diets will be given in deta

Recently excellent therapeutic results have been reported
the treatment of lupus vulgaris by the oral administration
vitamin D2 by Charpy in France in 1943 and Dowling and Thom
in England in 1945. Various methods have been employed, wi
doses ranging from 50,000 units daily to 600,000 units 3 times
week, with and without calcium by mouth. Vitamin D2 ten
to withdraw calcium from storage and has been known to cau
severe kidney damage as the result of calcification of the ren
tubules. Therefore signs of intolerance such as nausea, etc. shou
be watched for and blood calcium and non-protein nitrogen leve
observed periodically, together with x-rays of the kidneys.

I have personally had the privilege of seeing a patient with lupu
vulgaris of the face of many years duration in whom Promi
which I administered caused a severe local flareup, which sub
sequently in other hands, cleared up practically one hundred p
cent as the result of oral administration of vitamin D2 in a do
of 50,000 units once daily by mouth without calcium. This do

ell tolerated and was given over a 10 months period, at first month, then a rest of one month then on alternate 2 week ls.

tis, Taylor and Grekan reported favorable results in sarcoi- with variable doses ranging from 600,000 to 900,000 units with and without calcium.

possibility of toxicity must constantly be kept in mind in istering vitamin D2.

"Gerson-Sauerbruch-Herrmansdorfer Diet."

lium chloride (salt), canned foods of all kinds, smoked, salted nd spicy meats, smoked and salted fish, vinegar, bouillon cubes

sh meat (500 grams per week), internal organs (calf's thymus, rains, liver, lungs, kidney and spleen), fresh fish, pepper, meat xtracts, beer, Malaga and red wine (as ingredients in food), offee, tea, cocoa (only to flavor milk)

ed.

lk, approximately 1000 to 1500 cc. per day, in any form especially raw milk, furthermore, thick milk, milk with cocoa, nilk in puddings or rice, cream, kefir, cheese poor in salt and urds)

tter (unsalted dairy butter)

uit of all kinds (as much as possible raw, but also stewed ruit, preserves, marmalade, fruit wine, fruit salad, baked apples)

ad and vegetables (not parboiled but stewed), only fresh egetables (vegetable juice as a seasoning for soups and other lishes), tomatoes, carrots, especially grated raw with sugar, urnips, potatoes, cabbage, leek, beets, asparagus, cauliflower, ed and white cabbage, sauerkraut, cress, endive, lettuce, hubarb, sorrel, spinach, peas, string beans, lentils, mushrooms, cucumbers, and melons

ur of all kinds (unsalted bread, whole-wheat bread, pumper- nickel, zwieback, noodles, macaroni, cookies, etc.), eggs (in nayonnaise, puddings, custards and cakes)

e (not unhulled Rangoon rice), Cream of Wheat, cornmeal, apioca, barley and oatmeal

gar, especially brown sugar candy, genuine bees' honey; olive oil and lard

e following spices should be freely used in order to replace the ack of salt in the food; bone dust, herbs of all kinds, marjoram, arragon, dill, borage, onions, peppermint, laurel leaves, chive, umin, lemon, parsley, celery, garlic, horseradish, black radish, adishes, ginger, vanilla, cinnamon, aniseed, dried currants, lmonds, cocoanut, nuts, raisins, nutrient yeast, etc.

Meals.

7 A.M., a thick soup (oatmeal, rice, cornmeal or tapioca o in approximately 300 cc. of milk with some water, ½ tablespoonful of butter, sugar, lemon or cinnamon or va 1½ tablespoonfuls of cod-liver oil with phosphorus

9 A.M., weak coffee (chiefly malt with a few grains of coffee much milk, bread with either butter or preserves or hone

10 A.M., fruit or stewed fruit

Dinner at 12.30 P.M., soup, one course and dessert (fruit)

4 P.M., milk (cocoa or coffee), cake, cookies, zwieback, bread either butter or preserves or honey

Supper at 6.30 P.M., 1 course and fruit

8 P.M., thick soup as in morning, 1 tablespoonful of cod-liv

Suggestions.—As may be seen from the preceding, the diet sists of mixed foods administered in numerous meals. Raw v table foodstuffs rich in vitamins are prevalent. The calorie high (40 to 45 Calories for every kg. [2.2 pounds] of body wei but less high than usually given in the majority of sanatoria. diet contains approximately 90 grams of protein, 160 grams of and 220 grams of carbohydrate, a ration of 1.5 protein, 2.7 3.7 carbohydrate per kg. Fats are relatively high, carbohydr relatively low. Overfeeding with animal proteins, against w many specialists warn, is avoided by the restricted consump of meat. The intake of proteins is nevertheless considerable. raw and stewed vegetables provide for the mineral salts in the fo

The characteristic feature of this diet is the lack of common and abundance of other minerals. It has been proved by ma experiments that it is possible in this manner to influence the co position and functions of body juices and tissue.

Salts and ions are present in the sound organism in an absolut distinct ratio. Since the ions coöperate and counteract each ot in a very complicated manner, a change in one point of the elect lytic system suffices to disturb the order, according to Loeb, Sp Kraus, Zondek, Arnoldi, Wollheim. It is known that the nat of the cell colloids, the solution and precipitation of protein, surf tension, excitability of the nervous system (especially of the ve tative nervous system), hydration and dehydration of the tis and many other features depend upon the presence of certain io Calcium dehydrates, acidulates and stimulates the secretion ammonia (Spiro) and therefore plays an important part in fight against inflammation. In disease, the physiologic equil rium of the ions is disturbed in accordance with the changed fu tion. It may also be changed from the outside, especially throu food, and this change, in turn, influences cell and tissue functi

"Gerson Diet." Difference Between "Gerson-Herrmannsdorfer-Sauerbruch's Diet" and "Gerson Diet."

Gerson decreases the intake of protein considerably, givi only 67 grams per day, 12 grams of which are vegetable prote

, these proteins are sometimes eliminated, for instance in ma, hypertonia, eczema, acne, etc., by inserting days with a very ous diet. These rigorous days accelerate the cure greatly. In cases, it is necessary to insert protein days.

other difference from Sauerbruch's diet is the use of vegetable fruit juices. Not only beer, tea, coffee and wine, but soups of inds, water, lemonades, etc., are severely forbidden. The entire d intake is supplied by vegetable and fruit juices, of which ers are consumed daily. These juices, by their vitamin and ral content, stimulate the cellular function together with the grams of raw fruits, 50 grams of raw salad, 3 eggs and 30 grams d-liver oil.

esides tuberculosis of the lungs, kidneys, larynx and skin, hemi-ia figures most frequently among the diseases treated and d, according to Gerson. He states that the entire diet therapy ted with this disease and it has the promptest and most brilliant t.

he healing of lupus by the salt-free diet induced Gerson to try diet in other skin diseases. He was the first to treat psoriasis observed extensive improvements and cures not observed with other treatment. He believes the effect is due to the dissolu- of the infiltrations by the diet. Independent of Gerson, Ruete Axmann drew attention to this effect of the diet in diseases he skin. Gerson says that keloids regress in a really surprising nner. They become soft, flat and of a normal color. Theoret-ly, one may assume solution and elimination of the salts depos- in these changed tissues. The origin of the scars plays no e. Pleural indurations, peritonitic adhesions, etc., react quite favorably in Gerson's experience.

The favorable result in multiple sclerosis may also be due to the solution of scars in the central nervous system. There is no estion of a specific effect. The diet naturally has no effect if nerve tissue is destroyed.

Gerson treated 2 cases of tabes associated with lancinating ns, 3 associated with gastric crises and 5 cases of luetic aortitis. e patients were relieved of the painful symptoms. In 2 of the es the Wassermann reaction became negative.

Gerson noted that many other diseases reacted favorably without being possible to explain the effect. The vague phrase of "alter-on of the constitution" must suffice. It is probably a question of hange in the mineral metabolism and the entire internal secre-n. In several individuals, physiologic salt seems in a general y to inhibit or injure the cellular function. By its withdrawal the simultaneous administration of various vitamins, the lular function is improved and stimulated, and the injuries re or less healed.

vised.

ruit (citrus and southern fruit, almonds and nuts alternately with the other fruits, which can be used freely)

Advised—Continued.

- Vegetables, prepared with fresh butter or fresh oil, coo[ked in] their own juice, without sugar or flour, freely one to tw[o times] a day
- Green salads, tomatoes, etc., without vinegar
- Brown eggs, 2 to 3 daily (best taken with lemon or orange
- Vegetable juices, raw, as much as possible, prepared acc[ording] to prescription; to be sipped very slowly. (Beginnin[g with] 3 glasses a day, slowly increasing to 6 to 8 glasses)
- Fruit juices, 3 glasses a day

Omit.

- Table salt
- Tobacco (even one cigarette a day is strictly forbidden)
- Alcohol (except absinthe, Malaga, cognac, etc.)
- Coffee (except black coffee as a cardiac stimulant)
- Tea (except absinthe tea, etc., in case of intestinal disturba[nces])
- Water, soda water, lemonades, mineral waters of all kinds
- Soups
- Whipped cream and cream as a beverage
- Pepper, vinegar, mustard
- Conserves of all kinds
- Salted or smoked fish, sardines, sardelles, salmon, caviar
- Chocolate and cocoa
- Salted cheese, practically all kinds of cheese, except cottag[e or] pot cheese
- Sugar (except about 20 grams per week for special treats)
- Honey (except about 50 grams per week on special permissio[n])

Limit.

- Milk or buttermilk, 1 glass per day, about 200 grams
- Flour, rice, Cream of Wheat, etc., in the amounts given in [the] weekly average
- Meat and fish (each once a week). The 100 grams permitted [may] be given in smaller rations on two or three days. On [the] other hand, meat and fish may be eliminated. An increas[e is] only exceptionally indicated
- Potatoes, despite their carbohydrate content, should be eate[n at] least three times a week, baked in the skin (forbidden in c[ases] of obesity)
- Bread, salt-free bread (high in proteins), salt-free Graham br[ead,] pumpernickel, etc. On prescription, 40 to 80 grams per [day,] somewhat more for physical workers
- Oatmeal, once or twice a day (40 grams of oatmeal with 10 gr[ams] of butter according to the case, either forbidden or allowe[d])
- Puddings, eggs, sweetened dishes, ice-cream (on prescripti[on]) each once a week (about 100 grams)
- Cottage cheese, on prescription, 10 to 50 grams daily (to [be] forbidden on the strict days)

Sample Menus.

[In t]he following tables, the sodium chloride is calculated accord-[ing to] Strauss's average:

Daily.	Amount. gm.	Salt content, mg.
Milk	250	400
Cream	10	15
Cottage cheese	20	40
Butter (unsalted)	100	30
Gerson bread	60	6
Potatoes	300	150
Oatmeal	40	60
Oil	25	
Vegetables	500	550
Fruit	500	150
Brown eggs	4	32
	Total	1433 mg.

Weekly.	Amount.	Salt content, mg.
Cream	150 grams	195
Egg	1	35
Yolk of egg	1	3
Sugar	20 grams	20
Honey	50 grams	
Cream of Wheat	50 grams	3
Meat	100 grams	130
Fish	70 grams	66
Flour of wheat	35 grams	3
Rice	50 grams	31
Almonds	100 grams	40
Nuts	100 grams	110
Prunes, etc.	200 grams	240

Sum of weekly amount: 876 mg. ÷ 7 = 125 mg. daily
Sum of daily amount: 1433 mg. daily

1558 mg. daily

[Th]e total intake of calories is distributed:

Proteins . . . 67 grams = 275 Calories = 10 per cent
Fats . . . 170 grams = 1581 Calories = 56 per cent (without cod-liver oil)
Carbohydrates 235 grams = 964 Calories = 34 per cent

[Su]ggestions.—With this diet, which is given in all of the mild [cases], the patient receives 2820 Calories daily in the weekly average. [On] the basis of these values, the diet may be called somewhat [lowe]r in calories than the average normal diet, but very rich in fats.

poor in carbohydrates and with a moderate protein content rich in vitamins of all kinds, but poor in sodium chloride, the of physiological salt being below the upper limit of No "rigorous degree" and somewhat above Strauss's rigorous rest of physiologic salt. All its components form a complex according to Gerson's experience, furnishes the optimal po ties for healing and for the permanence of the healing. Ch in this diet often interfere with the effect, except the syste insertion of days with an entirely different diet. These especially the raw diet days, seem to act as a stimulant metabolism. The raw diet days are characterized by prohi of cheese, meat, fish, all dishes containing or prepared with hydrates, and cooked vegetables (except baked potatoes, which be eaten with the skin, maximum 200 grams per day). Not than 40 grams of bread are allowed on these days. In ord stimulate the diuresis, much apple juice and lemons are In many cases, the insertion of such days at the beginning treatment is very favorable. These days being also low in (fast days) reduce the consumption of protein still further, s average consumption of protein of an average patient is near 50 than to 60 grams.

Lupus Erythematosus. — **Discussion.** — The author recently served very striking results in several cases of lupus erythema and erythema figuratum perstans, both of which are regarded as due to some focus of infection, either streptococcic or tubercu with the use of a diet for two weeks consisting of "total" exclusi sodium chloride, and the use of vegetables, raw or slightly coo vegetable juices, either raw or extracted without boiling, fruits a suitable salt substitute. An insufficient number of cases has observed to justify any final conclusions. Refer to Salt-poor I

Urbach has personally observed good results in some case lupus erythematosus by the use of the salt-restricted diet of Sa bruch and Herrmansdorfer, although other cases have faile respond. He cites a number of other observers who have obta favorable results by this diet.

At least three types of lupus erythematosus are recogni chronic discoid, subacute disseminated and acute dissemina The latter is usually associated with fever, polyserositis, kid damage and often ends fatally. Crude liver extract intraglute in a dose of 2 or 3 cc. two or three times a week is beneficial i cases. Gold intravenously or bismuth intramuscularly may used in the first two types but not in the acute disseminated. Ul violet light is harmful in all types. Removal of obvious foc infection is recommended in the first two types but not in third until adequate supportive measures such as liver thera diet, transfusions, etc. have improved the patient's general c dition. On the basis of preliminary work Burgess has felt t vitamin E may be of value in this disease.

Moniliasis. —**Discussion.**—Infection of the skin with the y fungus, monilia, may produce a variety of clinical m

ons. Nearly all of them however are characterized by in-
nent of flexural folds. Involvement of large flexural folds
s infra-mammary, axillary, intergluteal, crotch, etc. is spoken
intertrigo. It may be produced by other causes than monilia
ion. Chronic paronychia and interdigital erosion between
ingers is caused by monilia in association with prolonged
rsion of the hands in soapy water as in washing dishes, clothes,
Thrush is the name of monilia infection of the mouth, charac-
d by bright red areas with overlying detachable whitish thick
rane. Pruritus vulvæ, pruritus scroti and pruritus ani may
ie to monilia infection as well as to other causes. See also
che.

all cases of monilia infection disturbance in sugar metabolism
d be suspected since yeasts grow readily in the presence of
. No amount of local therapy with sulphur, etc. will cure
liasis if an associated diabetes is not diagnosed and controlled.

crobiosis Lipoidica Diabeticorum.—See under Xanthoma
e 314).

llagra.—Reference should be made to p. 486.

mphigus.—Discussion.—This is one of the most serious skin
ses, the majority of cases ending fatally in spite of all remedial
ures. The disease is characterized by an eruption of blebs and
e, usually arising on perfectly sound skin, later rupturing and
ing crusts. Redness may develop secondarily about the blebs
occasionally precedes them. This is in marked contrast to the
us type of erythema multiforme in which the redness is primary
the bullæ secondary. Often the earliest lesions of pemphigus
n in the mouth following some dental work. The disease may
ress rapidly with a fatal termination within one to six months
may become chronic, lasting over a number of years with
ds of exacerbation and remission. In severe cases large areas
ie body are denuded, so that there is profound toxemia and
k as in extensive burns. Fever is usually present. Lesions
lving the mouth and throat often seriously interfere with nutri-
. As the disease progresses there is a tendency for the renal
tion to become impaired, as evidenced by the phthalein output
blood nitrogen retention. There is also a definite chloride
ntion. These phenomena are probably due to toxemia. Pels
Macht have demonstrated the presence of a peculiar toxic sub-
ce in the blood in pemphigus which is capable of inhibiting the
th of certain plant seedlings, and on this basis have developed
ytopharmacological test for the diagnosis of pemphigus. Several
eties of pemphigus are recognized, but the one previously
ribed, namely pemphigus vulgaris, is the most common.

he cause of this condition is entirely unknown. Recently the
rvations of Ludy and Devalin, that viosterol in large doses has
arently cured several cases, suggests the possibility of a vitamin
iency. The author has also obtained gratifying results in 3 cases
emphigus by the use of viosterol in conjunction with other
sures. There is some evidence pointing to the possibility that

pemphigus may be due to a peculiar type of toxic reaction to
focus of infection. The foci of infection should certainly be s
and eliminated, if possible, and a high-vitamin diet would app
be rational as a means of improving resistance to infection a
sustaining nutrition in the presence of such an overwhelming
emia. Refer to the Vitamins and the Vitamin Deficiencies.

A filtrable virus has been held by some to be a possible ca
pemphigus. The author can corroborate several recent re
of the efficacy of sulfanilamide and more recently sulfadiazi
conjunction with prompt removal of infected teeth, tonsi
other obvious foci of infection. At least 5 cases of what appe
to be a hopeless condition have been cured by these comb
procedures although a number of other patients have not respo
to this program.

Suggestions.—In view of the fact that cases of pernicious an
give a phytopharmacologic test similar to that in pemphigus
that liver therapy is valuable in pernicious anemia, it would s
only rational to administer liver by various means in pemphi
The diet in general should be of high-caloric and high-vita
content, and should contain an abundance of proteins in view
the pronounced loss of proteins in the serous exudate from
extensive raw surfaces. The situation is similar to that in bu
In cases where mouth involvement interferes with eating, pro
hydrolysates may be given either by mouth or by vein. In
venous glucose and saline and blood or plasma transfusions m
be needed to maintain an adequate blood protein level. Accord
to Ludy and Devalin, vitamin D should be given in massive dos
from 10 drops to a teaspoonful three times a day. This, of cour
is a tremendous dose and would be justified only in a disease w
such a serious prognosis. These large doses should not be contin
for more than several weeks and should be discontinued upon t
appearance of any untoward reactions. Both Ludy and Deva
and the author have employed such doses with no apparent ha
and with distinct benefit. Urbach favors the use of small do
of insulin to improve nutrition.

The use of sodium chloride is a matter of debate. Some inve
gators have felt that cases were benefited by the Sauerbruch-He
mansdorfer salt-restricted diet; whereas Urbach and others, feeli
that salt retention represents a form of defense reaction on the p
of the body against excessive destruction of protein, have observ
temporary improvement by the daily administration of 4 or 5 gra
of sodium chloride. It would seem logical to administer sodi
chloride in order to prevent salt depletion as the result of loss fr
extensive raw oozing surfaces. On the other hand, when eviden
fo renal impairment become sufficiently apparent, it would seem w
to adopt the approved methods and dietary measures appropri
for kidney disease. Refer to Bright's Disease.

Perleche.—This condition, which consists of redness, fissuring a
crusting at the commissures of the mouth, was considered by earl
writers to be caused by a streptococcus; more recently monilia al

has been regarded as etiologic, since it can usually be demon-ted in scrapings examined directly after maceration in 40 per cent l and by cultures on Saboraud's medium. Lesions also usually ond to local treatment for monilia.

uring the past several years, however, several investigators shown that perleche-like lesions accompanied by seborrheic atitis-like lesions of the naso-labial folds, cheilitis and glossitis associated with riboflavin deficiency. This brings up the tion of further investigation into the vitamin background of r known monilial infections, as well as seborrheic dermatitis. r to Riboflavin Deficiency. Vitamin B therapy does not, ever, clear up all cases of perleche. Local therapy with sulphur other fungicidal medication may be required. Some cases of eche are caused by ill-fitting dentures, especially in cases where gums have shrunk and the upper lip overhangs the lower lip sing an exaggerated fold at the corners of the mouth which are tinously wet with saliva. Only correction of the dentures with roper "bite" will relieve such cases.

igmentation.—Discussion.—Several anomalies of pigmentation be influenced to some degree by diet. Carotinemia has ady been discussed. Chloasma usually occurs on the face women as ill-defined blotchy brownish areas. The cause is nown but various disturbances of the utero-ovarian system e been blamed. Large doses of ascorbic acid have been helpful some cases. Vitiligo which consists of patchy loss of pigment f unknown etiology. Hathaway has obtained favorable results administration of large doses of vitamin B complex and hydro-oric acid over a period of 1 to 2 years. Some observers have that the pigmentation in Addison's disease may be helped to e degree by massive doses of ascorbic acid.

ruritus.—Discussion.—Generalized pruritus may be due to reat variety of causes, including food allergy, irritation from ernal sources such as woolen underclothing, excessive use of p and water, etc., and such metabolic disorders as diabetes, t, diseases of the liver and gallbladder, defective kidney function, mone deficiencies, etc. The dietary management therefore depend upon the etiology. A great many cases of generalized ritus with or without eruption are caused by a combination senile or extremely sensitive skin, cool dry weather and the essive use of soap and water, the so-called Pruritus Hiemalis. bies, pediculosis, etc. must always be ruled out.

soriasis.—Discussion.—Although the exact cause of this disease nknown, its course can be modified by dietary measures. Since ny cases of psoriasis are intimately associated with focal infec-s these should receive prompt attention. The disease, at best, xtremely rebellious to treatment and most capricious in its avior, frequently disappearing spontaneously, but usually sooner later recurring to a greater or less degree. It does not appear be contagious although occasionally one or two relatives may affected. Endocrine therapy is under investigation. Some

cases are benefited by administration of thyroid. Ane occasionally an important factor.

Some cases of psoriasis are associated with a hypochlor and occasionally hyperglycemia is noted. The dietary m ment of these cases would naturally be directed toward pathologic changes (reference should be made to diets elsew Some cases of psoriasis react favorably to a restriction of pr and several investigators have observed benefit by an exc of sodium chloride. Some investigators have claimed that turbance in fat metabolism occurs in psoriasis and have ad a restriction of fats in the diet, but others dispute these fin Urbach feels that in the dietary management of psoriasis caloric intake is more important than restriction of prot fat per se. Obviously it would not be desirable or practic maintain a low caloric intake for any great length of time.

Omit.

Meats, cheese, eggs, nuts, alcohol, salt, candy, sweet dr mushrooms, fish of all kinds

Limit.

Sugar, pastries, milk, navy beans, kidney beans and lentils

NOTE.—No salt and very little sugar should be used in the p aration or serving of the meals. As flounder and white perch lowest in protein they may be judiciously infiltrated into the at a later period.

Suggestions.—This rigid low-protein diet should not be prescri for an indefinite period. It is better to reserve it for the se and extensive cases and for not more than a month or two a time, allowing a less severe diet containing meat or fish three four times a week, and occasionally eggs, between periods of r restriction. The diet should contain an abundance of vitamins. is desirable to have the patient at rest in a hospital, sanatorium health resort while on the diet. Not only is a slowing up of m bolic processes helpful but the relief from psychic turmoil nervous tension characterizing so many cases of psoriasis, wh attends a change of environment, is of considerable value.

Local medication is of considerable importance in the managem of psoriasis. Generalized exposures to ultra-violet light eit from the sun or from the quartz or carbon arc lamp are usu beneficial although some acute and extensively involved cases aggravated. If light therapy is contemplated it should be be with small doses. According to Goeckerman, the application crude coal-tar ointment, which can be cleaned off just before light treatment is given, enhances the effect of the light. Reduc agents such as anthralin or chrysarobin in weak dilution are value.

Seborrhea, Seborrheic Dermatitis.—**Discussion.**—Seborrhea is term applied to an excessive secretion of oil. This usually oc on those parts of the body where the oil glands are most hig

loped, such as the central portion of the face, forehead, scalp, ral portion of the chest and upper back. With a background borrhea, several conditions may develop, such as acne vulgaris seborrheic dermatitis. The latter is characterized by salmon- to yellowish macules usually covered by greasy scales; the tion is frequently seen extending below the hair along the t and sides of the scalp, and often involves the vestibules and ls of the ears.

here is undoubtedly a microbic element in this condition, as enced by the almost specific response to ointments containing hur and salicylic acid. Various organisms have been found, ding cocci, bacilli and yeast-like parasites, and it is possible any one or a combination of these, in conjunction with a able soil characterized by excessive oiliness, may produce the ase. Endocrine disturbance may be an important factor also, eborrhea nearly always occurs to some degree during the age uberty and adolescence, but no satisfactory method of attacking condition from this angle has yet been found.

rom a dietary point of view, the indications outlined under heading of acne vulgaris are applicable to seborrheic dermatitis. se procedures may help in the handling of these conditions, but themselves can hardly be regarded as curative. There is a wing impression that disturbances in gastro-intestinal function possibly some of the vitamin B factors may be of importance this condition.

arcoid.—Discussion.—Refer to use of vitamin D_2 under Lupus lgaris.

Test Diets in Food Allergy.—Discussion.—Hypersensitiveness to teins, or atopic allergy, manifests itself in certain well-recized clinical symptoms, chief among which are eczema, urticaria, gioneurotic edema, asthma and hay fever. In addition to these, re are a number of less commonly recognized symptoms which y be allergic in origin, such as migraine, epilepsy, nasal contion, "auto-intoxication," some cases of canker sores, pruritus and pruritus vulvæ, gastric distress, and various chronic and te abdominal manifestations which at times may simulate acute gical conditions. It must be clearly emphasized that the disers enumerated are by no means always due to protein hypersitiveness and some of them are probably only rarely due to h causes, but the very fact that all of them have been clearly nonstrated to be due to allergy in certain cases justifies the sideration of this cause in the absence of any other definite logic findings.

Pollens, dust, animal emanations, face powders, etc., are probably commonest causes of asthma and hay fever and the causal tionship can usually be demonstrated by means of either the tch or the intradermal test. The other clinical manifestations tioned, when due to allergy (and again it must be emphasized t there are many other possible causes) are more often due to ersensitiveness to food proteins. Certain cases of asthma and

of perennial hay fever may also be due to food proteins, and c cases of eczema and urticaria may be due to pollens, powder animal emanations. While scratch tests and intradermal are of value in determining the causal agent in many cases of allergy, it has become increasingly apparent that many pat who are definitely hypersensitive to certain food proteins fa react to scratch or intradermal tests even when performed potent allergens and in a proper manner. Conversely, po scratch tests have been recorded in patients in whom sensitiz to the reacting food was not clinically present as indicated failure of the suspected foods when ingested to produce sympto

The need for a more reliable test in the detection of food all has led to the development of test diets. Originally, this invo a period of starvation or a diet limited to one or two foods, follow which one or two foods were added every few days and the e noted. The disadvantage of this method was the difficulty in se ing the full co-operation of the patient owing to the unpalatab of such a restricted diet, the long time required to cover the lis common foods and the occasional undesirable effects of an unb anced ration.

Rowe has been a pioneer in establishing the technique of the t diet on a scientific and practical basis. In one series of 175 patie in whom sensitization to certain foods was proved by test di and in whom the cutaneous reactions were tested, approximat 50 per cent of the patients gave negative reactions. In this gro by far the greatest number of patients were sensitive to whe eggs and milk. In order of frequency, 57 per cent were sensiti to wheat, 35 per cent to eggs and 31 per cent to milk. Only 10 p cent of this group of patients were sensitive to chocolate, whi was next in order of frequence, while the shellfish which are usua regarded as being common offenders caused trouble in a very sm proportion, 3 per cent of the patients showing an intolerance lobster, 2 per cent to crab, 3 per cent to shrimp, etc.

Rowe's diets, of which there are several modifications, attem to place the patient on a well-balanced, palatable regimen, at t same time excluding the foods which clinical experience has sho to be the most frequent offenders. Three or four such diets co taining mutually exclusive proteins may be tried in rotation or combination as the history, clinical aspects of the case, or skin te indicate. It is recommended that a patient be kept on a giv diet at least a week or ten days before changing or adding a other foods, unless the diet in question causes a definite exac bation of symptoms, in which case it should be abandoned. The diets, while reasonably well-balanced and palatable, require a c tain exercise of will power, especially if one is eating away fr home, as milk, eggs and wheat are omitted from all of them. T also involves foregoing butter and cream. Considerable vigilan must be exercised as these three substances are used so frequent especially in restaurant cooking; for instance, egg-white in gla

ain types of rolls, egg shells in clearing coffee, wheat flour rowning chicken or thickening soups or gravies, butter in ing vegetables, etc. Since even minute amounts of protein hich a person may be sensitive are often just as likely to produce gic symptoms as a larger amount, rigid adherence to the diets t be insisted upon.

the symptoms disappear on the test diet regimen after one to weeks, one or the other of the diets may be added to the first , if the patient continues symptom-free, fruits, vegetables and ts may be added two or three at a time every three or four days. t of all wheat, eggs and milk may be added at weekly intervals, the effects noted.

ccasional instances will be found where a patient is sensitive to rly all members of a certain group of foods, such as all fruits, meats, etc. Special test diets may be devised to meet such a ation. More recently Rowe has suggested a cereal-free diet, uding all grains and utilizing soy bean flour, potato flour and ioca for starches, as a beginning diet in average cases. This also excludes milk and eggs.

he following three diets will be found useful in detecting foods vhich a person may be hypersensitive:

	Diet No. 1.	**Diet No. 2.**	**Diet No. 3.**
eals . .	Rice Puffed Rice	Corn Corn flakes Hominy Tapioca	Rye
ad . . .	Rice biscuit	Corn pone	Ry-krisp
at or fish .	Lamb	Bacon Chicken	Beef
getables . .	Lettuce Spinach Carrots	Squash Asparagus Peas Artichokes	Tomatoes Beets String beans
uits and ams and ruit drinks	Lemon Pears Peaches	Pineapple Apricots Prunes	Grapefruit Apples Grapes
iscellaneous	Sugar Olive oil Salt Gelatin Syrup made from cane sugar Maple flavoring Olives (unstuffed)	Sugar Mazola oil Salt Karo corn syrup	Sugar Wesson oil or Crisco Salt Gelatin Syrup made from cane-sugar flavored with maple

In Rowe's experience, desensitization to a given protein is diffi-lt to achieve by feeding graduated quantities of the food, but

occasionally occurs spontaneously when the food is entirely ex from the diet for a long period of time. Prolonged heating sionally modifies the protein molecule so that symptoms d occur when the food is ingested. Refer also to Exudative Dia

Recipes.

The following are tested recipes taken from Rowe's "Food All

(a) *Rice biscuit* prepared by the Battle Creek Sanitarium, o bread made according to the following recipe:

2 cups of rice flour	1 tablespoonful of sugar
3 teaspoonfuls of baking powder	$\frac{1}{2}$ teaspoonful of salt
2 tablespoonfuls of bacon fat or olive oil	1 cup of water

Sift dry ingredients and mix in the bacon fat. Add water to firm dough. Bake in a loaf pan in a rather hot oven.

(b) *Fruit preserves* specified in these diets may be pure je jams or preserves made at home of fresh, canned or dried fruit

(c) *Rice gruel* made by cooking rice to a soft mass, adding w to consistency of thick cream and sugar and salt to taste. L broth or pineapple or other specified fruit juices may be use dilute it if desired. Serve hot as a substitute for milk.

(d) *Rice-peach pudding.* (A similar pudding made with tap or cornstarch can be used in Diet No. 2.)

2 halves of peaches (canned)	$\frac{1}{2}$ cup of cooked rice
$\frac{1}{2}$ cup of juice	2 teaspoonfuls of sugar

Add sugar and peach juice to rice, cook three minutes, add pea (sliced). Chill and serve. (1 cup or 2 servings.)

(e) *Corn pone:*

$\frac{1}{2}$ cup of cornmeal	$\frac{1}{2}$ cup of boiling water
$\frac{1}{3}$ teaspoonful of salt	

Sift cornmeal and salt, add boiling water to make a firm mixt Shape into thin cakes and place in a pan well greased with ba fat or Mazola oil. Bake in a hot oven ten to twenty minutes.

(f) *Rye-rice bread:*

$1\frac{1}{3}$ cups of ground rye flour	10 teaspoonfuls of baking pow
$\frac{2}{3}$ cup of rice flour	2 teaspoonfuls of olive oil
6 teaspoonfuls of sugar	$1\frac{1}{3}$ cups of water
$\frac{1}{2}$ teaspoonful of salt	

Bake in a loaf pan in in a moderate oven for forty minutes.

(g) *Cornmeal, rye and rice bread:*

1 pint of warm water	1 yeast cake dissolved in wat (warm)
1 heaping teaspoonful of salt	
1 cup of rice flour	$\frac{1}{2}$ cup of Karo syrup
1 cup of cooked cornmeal	

To the mixture add rye flour to make a thick dough and let r Mold and place in the pan to rise again. Bake in a moderate o for thirty-five to forty minutes. This bread will stay moist several days when well wrapped with oiled paper.

Crisco butter made by adding fresh carrot juice for coloring
isco and salt to taste, or by adding yellow coloring and confec-
rs' butter flavor and salt.

ets 1 and 2 may be prescribed together or either added to the
. The following breads may be used in such case:

rn and Rice Muffins:

$1\frac{1}{3}$ cups of rice flour	$\frac{1}{2}$ teaspoonful of salt
cup of cornmeal	10 teaspoonfuls of baking powder
$\frac{1}{2}$ tablespoonful of sugar	1 cup of water
$\frac{1}{4}$ cup of olive oil	

at about three minutes. Put in small-sized muffin tins and bake
ediately in a quick oven (450° F.). Have pan smoking hot.

TE.—Using the small-sized muffin tins, $1\frac{3}{4}$ inches in diameter,
es a lighter and better raised muffin.

ice Flake Muffins:

1 cup of rice flakes	1 teaspoonful of salt
1 cup of rice flour	5 teaspoonfuls of baking powder
$\frac{1}{2}$ cup of cornmeal	2 tablespoonfuls of corn oil
1 tablespoonful of sugar	$1\frac{1}{4}$ cups of water

ETHOD.—Crush rice flakes, sift other dry ingredients together,
other dry ingredients together, stir and put into well-oiled muffin
or add 3 teaspoonfuls of baking powder and make into a small
. Bake muffins twenty to thirty-five minutes in moderate oven.

lcers, etc.—Discussion.—Dietary management may consti-
an all-important factor in the proper healing of certain
es of ulcers, wounds, burns and even chronic roentgen der-
itis. Ascorbic acid plays an important rôle in the physiology
nesodermal tissue and must be present in adequate amounts
nsure proper healing. In chronic ulcers and burns there is a
siderable loss of protein which again is necessary for reparative
esses. This loss should be made up by adequate protein
ke or protein hydrolysates. A number of authorities as quoted
Urbach in "Skin Diseases, Nutrition and Metabolism" have
erved good results in chronic infected ulcers and even in severe
ntgen dermatitis through the employment of the Sauerbruch-
mansdorfer diet.

rticaria and Angioneurotic Edema.—Discussion.—One should not
ume that all cases of urticaria or angioneurotic edema are due to
l sensitization, although this undoubtedly constitutes a promi-
t cause. Various insects such as the flea, bedbug and acarus
biei may produce, in addition to their own characteristic lesions,
e widely scattered typical urticarial wheals in persons who have
ome hypersensitive to their bites. Urticaria and angioneurotic
na are not infrequently the expression of a bacterial allergy
inating in some focus of infection such as the sinuses, tonsils,
h, etc. Drugs, heat and cold, pollens, endocrine disorders,
ro-intestinal derangements and even syphilis may account for
born recurring attacks of urticaria.

Since some cases of urticaria are due to food allergy, skin or elimination diets should be employed as soon as possible diet prescribed in accordance with the findings. Skin tes quently fail to offer any clues in urticaria and it should be em sized that in chronic urticaria bacterial allergy from a fo infection is more often the cause than food allergy. Certain are probably greater offenders than others in the producti urticaria, and in the absence of specific information from etc., one may outline a tentative diet. Refer also to Allerg Exudative Diathesis.

Omit.

Shell-fish, fish, canned food, raw fruits, alcohol, spiced or sm meats, candy, sweet drinks, nuts, cheese and pork

Limit.

Pastry, ice-cream, meats, cake

Suggestions.—The diet should contain an abundance of milk calcium is usually beneficial in this disorder. Calcium may be administered orally or intravenously. The food should co largely of cooked vegetables, cooked fruits, meats such as l lamb or chicken, and an abundance of water. Epinephri ephedrin are useful adjuvants in controlling the eruption. adryl or pyribenzamine in doses of 50 mgs. 3 or 4 times in 24 h are frequently of decided benefit. The bowels should be kept open. Refer to the list of Foods Highest in Calcium.

Xanthoma.—**Discussion.**—Four types of xanthoma are re nized: xanthoma palpebrarum (or xanthelasma), xanthoma berosum multiplex, and xanthoma diabeticorum, and xanth disseminatum. Xanthoma palpebrarum may occur alone on eyelids or in association with the other varieties of xanthoma it is likely that all four types are closely related, representing turbances in the lipoid metabolism, yet only the diabetic typ amenable to any extent to internal treatment. Recent inve gation has shown that in xanthoma tuberosum multiplex total lipoids are not necessarily increased but that there is a turbance in the ratio between the lipoid substances. Since mechanism regulating this balance is not known, dietetic treatm for this variety of xanthoma has not been established. In c showing a definite increase in total blood lipids, a low-fat die indicated. Some benefit may be obtained in certain cases of b xanthoma palpebrarum and xanthoma tuberosum multiplex fat restriction. Cases accompanied by gall-bladder disease sh receive appropriate treatment, both dietetically and otherwise.

Xanthoma diabeticorum which is probably the rarest of four types is more acute in its developement. The lesions be generalized but are most frequent on the extensor surface the elbows, knees, buttocks, hands and face. The early lesions yellowish or cream-colored conical papules which increase in s frequently forming confluent areas. A narrow reddish infl matory areola occurs about each lesion.

eruption is associated with diabetes and the treatment is me as for that disease. As the diabetes is controlled by diet nsulin the eruption usually disappears. Thyroid extract etimes a useful adjuvant and fractional doses of Roentgen-ay cause the lesions to disappear more rapidly.

thoma disseminatum is usually not associated with elevated lipids and its prognosis is not too good.

crobiosis Lipoidica Diabeticorum.—This is another relatively ype of skin disorder associated with a deposit of lipoid material of skin disorder associated with a deposit of lipoid material skin apparently secondary to a toxic injury producing a rade necrosis but usually without ulceration. The lesions most commonly on the shins and consist of well defined es having a translucent yellowish appearance. Most cases sociated with diabetes. Treatment is unsatisfactory although ol of the diabetes may prevent further development of lesions. nin E intragluteally deserves a trial in view of an interesting recently reported by Dixon.

DIABETES MELLITUS.

JAMES J. SHORT, M.D.

troduction.—1. **Importance of Diet.**—The choice of a proper diet he diabetic is a matter of as great importance as ever. In fact, er dietetic management constitutes by far the greatest part of treatment. The discovery of insulin has served to enhance er than diminish the need for careful study of the individual in order to provide a diet having the most suitable proportions rbohydrates, proteins and fats.

Undernutrition.—Although recent experiences have done much hange time-honored conceptions of what constitutes an ideal etic regimen, there are two fundamental principles which are lly agreed upon and emphasized—undernutrition and the gen-avoidance of concentrated sugars. Undernutrition is gen-y regarded as the foundation principle of successful treatment. this term is not meant a state of continual semi-starvation, rather a caloric intake sufficient to maintain the body weight —preferably somewhat below—the general average for age, and height.

Pathology and Response to Diet.—A brief consideration of the ogy and pathology of diabetes will aid in understanding varying onses to certain diets and thus assist in making the necessary stments. Although recent investigations have demonstrated one or more of the endocrines may be factors in the produc-or modification of a diabetic state, it is a well-established fact destruction or severe impairment of the islands of Langerhans e pancreas will result in diabetes. Such destruction can be ted experimentally by anterior pituitary extracts, by a chemical as alloxan or by special feeding procedures. It may also t from a hereditary tendency to degeneration, a pancreatitis dary to a biliary tract infection, arteriosclerosis, or from

"overstrain" in long-continued overnutrition. Fatty infil of the pancreas is frequently present at autopsy, though w this is the sequel of a previous pancreatitis or a concomit general obesity is often uncertain. Certain it is that obesi pre-diabetic condition and a predisposing factor in a large perc of cases. Fortunately Nature has been liberal in the pro of the highly important Langerhansian cells, so that approxi 10 per cent of their total are sufficient to protect against di Their total destruction would result in "total diabetes," a con which, though approached, is hardly ever seen clinically. retically, in a case totally incapable of producing insulin, n provement in carbohydrate utilization could be expected an amount of insulin sufficient to meet the entire requireme the body would necessarily have to be provided.

4. **Effect of Diet on Function of Islands of Langerhans.**—At au there are found cases in which the anatomic damage seems in cient to account for the developement of diabetes. These probably the patients who during life were capable of m improvement under proper dietetic management. Evidence been forthcoming to indicate that under adverse conditions ma functional depression of the island cells may ensue. The elimin of carbohydrates from the diet for as short a period as two may result in marked loss of glucose tolerance in normal individ The feeding of an exclusive meat diet to two individuals for one resulted in a temporary condition which from laboratory criteria essentially indistinguishable from true diabetes. From such dence it is obvious that island cells may become functionally mant, though anatomically intact, and thus temporarily incap of responding immediately to sudden demands placed upon th In non-diabetic individuals the return to a diet containing carb drates for a short time is sufficient to restore normal carbohyd tolerance. Most diabetics differ from normals only in degree; th fore, a certain amount of carbohydrate in the diet is essen Infections and toxemias also have a depressing effect on pancre function, so that Joslin has deplored the tendency to over patients convalescing from infectious conditions, believing tha do so places an undue strain on the already impaired pancre function and thus predisposes to diabetes. There is still no abso agreement as to just what the carbohydrate component of a should be for diabetes, but the general tendency for the past years or more has been for the use of increasing proportions. seems wiser to treat each case as an individual problem, bearin mind certain definite objectives, than to lay down hard and rules for all.

Objectives in Diabetic Management.—1. **"Desugarize" the Pat** —Most patients when first seen by a physician have large amo of sugar in both blood and urine, and suffer from attendant sy toms such as polyuria, polydipsia, dehydration, weakness, los weight, pruritus and furunculosis. Occasionally acetonuria is p ent, more often not. Little improvement can be expected u

lycosuria is controlled and the blood sugar reduced to more rate levels. Three methods of "desugarizing" can be used: (*a*) orary elimination or marked reduction of carbohydrate inges- or (*b*) use of insulin in sufficient quantities, or (*c*) both. It is good treatment to "desugarize" at first by the use of a carbo- ate-low diet and later to add carbohydrates as the patient's ance improves. Insulin may or may not be given according dications. Equally good results can be obtained from the of a standard diet of normally balanced food elements with dministration of sufficient insulin to effect desugarization. It is st an invariable rule that, with the disappearance of glycosuria hyperglycemia, carbohydrate tolerance undergoes coincident ovement, and other symptoms disappear. The consequent ration of water balance affords marked symptomatic relief.

Render Urine Acetone-free.—If acetone is present when the nt is first examined, an acidosis may be threatening. A carbon ide combining power of the blood is advisable. As an index nprovement, however, the usual tests for acetone and diacetic in the urine are excellent guides. In the presence of aceto- a, insulin should be given. The patient is best treated in a ital until all danger of acidosis is past. Later, the inclusion of cient carbohydrates in the diet, with insulin if necessary, will ent the recurrence of a positive test for acetone. In former s, when patients were treated with a minimum of carbohydrates, as shown by Van Slyke that cases under good control showed where from four to sixteen times the normal amount of acetone ies in the blood. Even such levels of acetonuria are usually fficient to give a positive reaction in the urine to the usual tests, so such cases would be considered acetone-free. Abnormal unts, although often present, do not occur so frequently with use of more liberal amounts of carbohydrates in the diet.

. **Restore Normal Weight.**—It is common to have a history of ked overweight followed by a sudden and marked loss of weight. patient may still be above ideal weight or show evidence of ciation. An adjustment of the diet over a few weeks or months ring the weight to a low normal is usually best for the future con- on of the patient. Especially should overweight be avoided. ar tolerance improves and danger of acidosis and other complica- s is much less imminent, when overnutrition and obesity are ented. In the writer's experience, several cases which had ked glucose tolerance impairment with glycosuria and diag- d as diabetes, had complete restoration to normal tolerance r the weight had been reduced to normal. This does not always pen, but improvement in carbohydrate utilization is the rule.

. **Avoid Hypoglycemia.**—Hypoglycemia has accompanying symp- s which range from mild hunger and nervousness to extreme tration, sweating, diplopia, delirium, unconsciousness, convul- s and death. In diabetic cases it occurs only in those treated insulin and results from a lack of balance between insulin dosage food ingestion, particularly of carbohydrates and proteins. It

has been shown that even one such attack can cause dam[...] the myocardium. Hypoglycemia occurs more frequently in ch[...] since in the latter the blood sugar is less stable and subject to g[...] variations. All patients using insulin should be taught to rec[...] the early symptoms and immediately to ingest orange juice, h[...] corn syrup, etc. It is safer as a rule to err on the side of too[...] insulin rather than too much. Gradual adjustment of die[...] insulin are preferable to sudden changes with attendant dang[...] hypoglycemia.

5. **Restore Physical Fitness.**—One patient, described by San[...] although in good condition, judged from laboratory and ph[...] criteria, complained of a lack of the sense of well-being. An ad[...] ment of the diet to a higher level of carbohydrate with a comp[...] tory drop in the level of fat, resulted not only in marked subj[...] improvement, but also in an increased carbohydrate toler[...] Confirmation of Sansum's observations has since led to the u[...] higher carbohydrate diets than formerly. Patients usually te[...] to feeling better on the higher carbohydrate-fat ratios prov[...] they are kept in good control. The glucose tolerance often s[...] marked improvement from such a change. The explanation o[...] apparent paradox of an increased ability to utilize carbohyd[...] following its increased ingestion is found in the opening paragr[...] of this subject. The more nearly the proportions of carbohydr[...] proteins and fats can approach the average "normal" diet wit[...] the necessity for unusual amounts of insulin, the better appare[...] will be the subjective mental and physical state of the patient.

6. **Keep Patient Satisfied With Diet.**—The use of low carbohyd[...] diets over long periods frequently causes patients to become [...] satisfied and discouraged. Especially is this true with you[...] patients. The longing for carbohydrates and the strong tempta[...] to indulge—which is, after all, a normal appetite—frequently o[...] come their resistance and cause them to partake of forbidden arti[...] Much of this difficulty is obviated by a more liberal diet. The de[...] for highly sweetened foods is apparently not so great if a la[...] amount of starchy foods is allowed. A metabolic mechanism un[...] to cope with the sudden demands of rapid sugar absorption ma[...] able to utilize well a fairly high-starch diet which requires consi[...] able time for digestion and absorption. It is often preferabl[...] increase the carbohydrates in the diet, even though this mean[...] increased dosage of insulin, to keep the patient satisfied. Th[...] preferable to having the patient take unknown foods and thus [...] entirely out of adjustment.

Choice of a Diet.—1. **Caloric Requirement.**—In choosing a [...] for the diabetic patient, it is well first to determine the cal[...] requirement. This will vary according to the physical state of [...] patient. If overweight, a submaintenance diet will be requi[...] If underweight, one giving more than maintenance should [...] selected. A safe maintenance rule for the patient engaged in l[...] physical activity is to allow 30 calories per kilogram (2.2 pou[...] of *ideal* body weight. Or, if desired, one can determine from [...]

weight and height of the patient, the normal surface area in e meters (refer to Obesity section), which, multiplied by the al number of calories per square meter per hour gives the l" total energy requirement. The addition of 25 per cent be allowed for light physical work, or more for greater activity.. ltimate guide to caloric requirement is the body weight taken quent intervals. If the patient is already of ideal weight, such t will usually be maintained; if under- or overweight there usually be some change in the direction of ideal weight.

Protein Requirement.—Having determined the caloric require-, an adequate protein requirement should be calculated. Again referable to calculate for the ideal rather than the actual weight. fe protein allowance to maintain nitrogen equilibrium and nt tissue waste is 1 gram of protein per kilogram. It is highly rtant that the protein requirement be fully met, and safer xceed than to give less than the necessary amount. The nt required will usually fall between 60 and 100 gm.

Carbohydrate and Fat Adjustment.—The caloric value of the in (4.1 × grams protein) should be subtracted from the total ies of the diet and the balance of calories made up by fats and hydrates. Here more leeway is permissible and one cannot be dogmatic. A discussion of the principles here involved will be ded in the description of the diets to follow.

Vitamin and Mineral Requirements.—Every diet prescribed for inued administration should be carefully surveyed for adequacy tamins and minerals. Increasing evidence is accumulating to ate that vitamin deficiencies are more common in average aries than formerly supposed. Present-day milling processes the production of highly refined flours are robbing American s of much of the greatly needed vitamin-B complex. It has estimated that only about 9 per cent of this substance derived grain is now present, as compared to the flours of a hundred s ago (Cowgill, 1939). Newer methods of milling, however, promise that the wheat-germ may be retained in a white flour. nce these facts obtain in the average unrestricted American ary of today, it is to be expected that it will be all the more true e special restrictions are imposed as in diabetes. Apparently greatest danger of inadequacy is in the B complex. Vitamin A be stored in the body for use over long periods; C is abundant uits and fruit juices generally employed, while D is likewise ily available. Deficiencies in the vitamin-B group have been rted in diabetes even where the caloric needs were well supplied. ould appear that pellagra-like symptoms may be induced by rapid metabolizing of carbohydrate stores (Sydenstricker, 1939). sitis, cheilitis, delirium, and other pellagra-like symptoms seen rtain cases have been caused to subside by the administration icotinic acid. The so-called "protective foods," such as dairy ucts, eggs, green vegetables, and fruits, though excellent sources inerals and certain other vitamins cannot be taken in sufficient ntity to compensate for the low vitamin-B concentration in

highly refined flour. It would seem wise, therefore, especi diabetic diets, to avoid highly milled products and in cert stances to add the vitamin-B complex in the form of concentr food adjuncts. The possibility of deficiency symptoms a should always be kept in mind. Biskind has reported imp ment in carbohydrate tolerance in diabetics following the large doses of the B-complex vitamins orally and parent The writer has observed no such specific effect in several so treated and Biskind's suggestion of a specific effect in di still lacks general confirmation.

5. **Other Considerations.**—Since Sansum first called attenti the favorable and quite unexpected results obtained from th of larger amounts of carbohydrates with a compensatory dimin of fats, there has been a growing tendency on the part of stu of diabetes to increase the carbohydrate component and en higher carbohydrate-fat ratios. The advantages of such a ch are several, and can well be repeated here for the sake of empl Briefly, they are as follows: (1) Increased carbohydrate toler supposedly from a stimulating effect on dormant Langerhan cells, (2) disappearance of abnormal amounts of acetone bo from the blood stream, (3) restoration of physical fitness as denced by increased mental and physical alertness and vigor (4) greater contentment and satisfaction with the diet.

In certain cases there appears to be little or no response to increased carbohydrate ingestion, as the added amount merely appears in the urine. It may be assumed in this type of case the island cells are either largely degenerated or are incapabl being stimulated. Three courses are open, (1) a diminution of carbohydrate to a lower level (preferably to an amount not u 100 grams); (2) an increase of insulin to balance the higher ca hydrate value, or (3) a combination of (1) and (2). The case w will not respond in some measure by increased utilization of ca hydrate from a fairly high carbohydrate-fat ratio is fortunately r A gradual improvement in tolerance can be expected over a pe of time in most cases, provided hyperglycemia and glycosuria avoided. Persistent hyperglycemia suggests the possibility of p creatic strain with further damage to island cells and is to avoided at all times to prevent retrogression. Patients in whom pancreas, presumably because of advanced degenerative lesion incapable of responding to the stimulus of carbohydrate inges will not do well on too high a carbohydrate-fat ratio. In such c the carbohydrate tolerance may remain static or actually decre

Although it is probably true that relief of "strain" on an o burdened pancreas may result in improvement in function, i equally true that too great deprivation of carbohydrate will dim ish function. Joslin is of the opinion, in which the writer conc that 100 grams of carbohydrate is about the minimum on whic patient should be kept for any great period of time, even tho during periods of study and adjustment other amounts may deemed temporarily advisable.

TABLE 30.—**Weighed Diabetic Diets (Weights in Grams).***

Approximate value.	Meals.	Fruit, 6-12%.	Vegetables, 3%.	Vegetables, 6-9%.	Vegetables, 20%.	Cereals 10%.	Bread.	Eggs.	Meat or fish.	Milk.	Cream, 20%.	Butter.	Clear broth, coffee, tea.
arbohydrate 100 grams otein 70 grams t 90 grams lories 1500	Morning	100	As desired			100		2			50		As desired
	Noon	100		100					100			10	
	Evening	100			100				100			10	
	Bedtime						30			200			
arbohydrate 125 grams otein 80 grams at 100 grams alories 1700	Morning	100	As desired			100	30	2			50	10	As desired
	Noon	100		100					100		25		
	Evening	100			100		30		100		25	10	
	Bedtime						30			200			
arbohydrate 150 grams rotein 80 grams at 100 grams alories 1800	Morning	100	As desired			100	30	1		200		10	As desired
	Noon	100		100			30		100		25	10	
	Evening	100			100		30		100		25	10	
	Bedtime						30			200			
arbohydrate 175 grams Protein 80 grams at 100 grams alories 1900	Morning	100	As desired			100	60	1		200		10	As desired
	Noon	100		100			30		100		25	10	
	Evening	100		100	100		30		100		25	10	
	Bedtime						30			200			
arbohydrate 200 grams Protein 80 grams at 100 grams alories 2000	Morning	100	As desired			200	60			200		10	As desired
	Noon	100		100			60		100		25	10	
	Evening	100		100	100		30		100		25	10	
	Bedtime						30			200			
arbohydrate 225 grams rotein 80 grams at 110 grams alories 2200	Morning	100	As desired			200	60			200		10	As desired
	Noon	100		100			60		100		25	10	
	Evening	100		100	100		60		100		25	10	
	Bedtime						60			200		10	
arbohydrate 250 grams rotein 90 grams at 130 grams alories 2500	Morning	200	As desired			200	60			200		20	As desired
	Noon	200		100			60		100			20	
	Evening	200		100	100		60		100		25	20	
	Bedtime						60			200		10	
arbohydrate 300 grams rotein 90 grams at 140 grams alories 2800	Morning	200	As desired			200	60			200		20	As desired
	Noon	200		100	100		60		100	200		20	
	Evening	200		100	100		60		100		25	20	
	Bedtime	200					60			200		10	

* As used in the New York Post-Graduate Hospital.

The writer has found from extensive comparison of diets t most cases an interchange of higher with lower carbohydrat may be made without appreciable change in the patient's i diate condition, provided the diets interchanged are approxi of equal calories. This seems quite remarkable as the carboh contents are decidedly different. From a therapeutic stan it occasionally seems desirable to interchange these or s diets, as by so doing the principles of pancreatic "stimul and "rest" are carried out.

TABLE 31.—**Groups of Approximately Equivalent Foods Used Diabetic Diets.**

Breads.

Carbohydrate, approximately 15 grams.

Bread, graham, rye, white, whole wheat (small loaf)	1 slice
Graham Crackers	3 only
Saltines	6 only
Soda Biscuits	3 only
Uneeda Biscuits	3 only

Cereals.

Carbohydrate, approximately 10 to 15 grams.

Cornmeal, cooked	4 tablespoons
Farina, cooked	4 tablespoons
Hominy, cooked	3 tablespoons
Oatmeal, cooked	4 tablespoons
Ralston, cooked	3 tablespoons
Wheatena, cooked	3 tablespoons
Bran or Wheat Flakes	4 tablespoons
Shredded Wheat	1 only

Potatoes and Potato Substitutes.

Carbohydrate, approximately 15 to 20 grams.

Corn, cooked	4 tablespoons
Lima beans, except dried, cooked	4 tablespoons
Macaroni, cooked	4 tablespoons
Noodles, cooked	4 tablespoons
Peas, except dried, cooked	4 tablespoons
Potato, cooked	1 medium
Rice, cooked	4 tablespoons
Spaghetti, cooked	4 tablespoons

Meat and Meat Substitutes.

Protein, approximately 20 grams; Fat, approximately 20 grams

Meat, Fish, Fowl	4 ounces
Eggs	2 only
Cheese, American (5-pound loaf)	2 slices
Cheese, Cottage	4 tablespoons
Cheese, Swiss (5-pound loaf)	2 slices

Dietary Management in Diabetes.

tary Management.—For the most satisfactory results the diet be arranged to fit into the patient's daily life. It is necessary

Butter and Butter Substitutes.

Fat, approximately 10 grams.

utter	2 teaspoons
eavy Cream (40 per cent)	2 tablespoons
lad Oil	1 tablespoon
acon	4 strips

Fruits and Fruit Juices.

Carbohydrate, approximately 6 to 12 per cent.

s	Lemons	Pears, Bartlett
ots, fresh	Limes	Pineapple
ados	Loganberries	Plums
berries	Melons	Raspberries
nts, fresh	Oranges	Strawberries
efruit	Peaches	Tangerines

Carbohydrate, approximately 12 to 18 per cent.

erries	Figs, fresh	Nectarines
ies	Grapes, Grape juice	Pomegranates

Carbohydrate, approximately 18 to 20 per cent.

Bananas

Vegetables.

Carbohydrate, approximately 3 per cent.

ragus	Cucumbers	Peppers, green
s, string	Endive	Radishes
s, wax	Escarole	Romaine
greens	Kale	Sauerkraut
coli	Kohlrabi	Spinach
age	Leeks	Squash, summer
iflower	Lettuce	Tomatoes
y	Mustard greens	Tomato juice
y cabbage	Mushrooms	Turnip greens
d	Okra	Vegetable marrow
ory	Parsley	Watercress

Carbohydrate, approximately 6 to 9 per cent.

hokes	Celeriac	Oyster-plant
s	Dandelion greens	Parsnips
sels sprouts	Eggplant	Peas, canned
ots	Onions	Turnips, yellow

Carbohydrate, approximately 15 to 20 per cent.

s, lima	Corn	Potatoes
cept dried)	Peas, fresh	Yams

Foods of Negligible Caloric Value.

Bouillon	*Postum*	Mineral oil dressings (*recipes for salad* *may be used, substit* *eral oil for salad oil* *ting sugar*)
Broth, clear	*Sanka*	
Consommé	Tea	
Coffee	Vinegar	

to know where and when meals are taken and what foo available. Consideration of the cost of the diet is of vital impo For these reasons the dietary management of the diabetic m individualized. The following arrangements of diets have found practical in varied cases and may be used as a gu planning individual diets. For greater convenience in planning foods have been grouped as listed in Table 31. Necessary su tions may be made by consulting these groupings of foods. good nutrition, however, the patient should be encouraged to a dietary routine closely similar to those outlined.

In the diets which follow, the principles described in the for discussion have been generally carried out. Table 30 gives a mary of eight diets with caloric values ranging from 1500 to which cover the requirements of the majority of patients. Th tein values vary from 70 to 90 grams which also represent those frequently required. Carbohydrate values begin at 100 gram reach a maximum of 300 grams in Diet No. 8. Amounts are in grams and can be used as weighed diets in institutional pra The greater liberality which can be employed in the treatme diabetes at the present time, however, makes the use of food unnecessary and undesirable. Measured or even approximate are sufficiently accurate to insure good control except in un cases. For home use the diets listed in Table 30 have been expr as measured diets. Free choice of the lower carbohydrate tables and certain food accessories has been allowed. Since tamine-zinc insulin is effective at least twenty-four hours, a feeding before retiring serves to prevent the occurrence of h glycemia during the night. Such feedings are designated for time on the following diets.

Measured Diets.—These are arranged to correspond with weighed diets shown in Table 30.

Diet No. 1.

Approximately—Carbohydrate, 100 grams; Protein, 70 grams; Fat, 90 grams; Calories, 1500.

Breakfast:

Fresh fruit, in season:	
Apple *or* orange *or* peach	1 medium
or grapefruit	½ medium
or blackberries, melon cubes, pineapple cubes, raspberries, strawberries	4 tablespoons
Cooked oatmeal *or* farina	4 tablespoons
Eggs, boiled or poached	2
Cream, light	4 tablespoons
Coffee or tea	

Diet No. 1.—(*Continued.*)

n:	
t *or* fish (no gravy)	Medium serving (4 ounces)
tables (Group 1) cooked or raw:	
paragus, string beans, beet greens, broccoli, cabbage, cauliflower, celery, celery cabbage, chard, chicory, cucumbers, endive, escarole, kale, kohlrabi, lettuce, mushrooms, mustard greens, green peppers, radishes, romaine, sauerkraut, spinach, summer squash, tomatoes, tomato juice, turnip greens, watercress	As desired *Vinegar, lemon or mineral oil dressing may be used with salads*
tables (Group 2) cooked or raw:	
eets, Brussels sprouts, carrots, eggplant, onions, oysterplant, canned peas, parsnips, squash, yellow turnips	4 tablespoons
ter	2 teaspoons
it	As breakfast list
offee or tea	
r:	
at *or* fish (no gravy)	Medium serving
etables	As luncheon, Group 1
ato, baked *or* boiled	1 small
nashed	4 tablespoons
ter	2 teaspoons
it	As breakfast list
offee or tea	
ne:	
lk	1 cup
ad:	
Graham, rye, white, whole wheat	1 slice (small loaf)
r Graham crackers	3

Sample Menu.

fast:
nedium-sized grapefruit
ablespoons oatmeal
ablespoons light cream
oft-boiled eggs
ffee
heon:
mato juice
lice cold roast beef
ablespoons beets with hot vinegar and
easpoons butter
rge romaine and watercress salad with mineral oil French dressing
ablespoons pineapple cubes
a
er:
lery hearts and radishes
uillon
edium serving broiled filet of flounder
nall baked potato with
teaspoons butter
rge portion spinach with sliced lemon
edium-sized baked apple, with saccharine
offee
ime:
cup hot milk
slice crisp whole wheat toast

Diet No. 2.

Approximately—Carbohydrate, 125 grams; Protein, 80 gram
Fat, 100 grams; Calories, 1700.

Breakfast:	
Fresh fruit, in season:	
Apple *or* orange *or* peach	1 medium
or grapefruit	½ medium
or blackberries, melon cubes, pineapple cubes, raspberries, strawberries	4 tablespoons
Cooked oatmeal *or* farina	4 tablespoons
Eggs, boiled or poached	2
Cream, light	4 tablespoons
Bread:	
Graham, rye, white, whole wheat	1 slice (small l
Butter	2 teaspoons
Coffee or tea	
Luncheon:	
Meat *or* fish (no gravy)	Medium serving (4 ounces)
Vegetables (Group 1) cooked or raw:	
Asparagus, string beans, beet greens, broccoli, cabbage, cauliflower, celery, celery cabbage, chard, chicory, cucumbers, endive, escarole, kale, kohlrabi, lettuce, mushrooms, mustard greens, green peppers, radishes, romaine, sauerkraut, spinach, summer squash, tomatoes, tomato juice, turnip greens, watercress	As desired *Vinegar, lemon or eral oil dressin be used with sal*
Vegetables (Group 2) cooked or raw:	
Beets, Brussels sprouts, carrots, eggplant, onions, oyster-plant, canned peas, parsnips, squash, yellow turnips	4 tablespoons
Fruit	As breakfast list
Cream, light	2 tablespoons
Coffee or tea	
Dinner:	
Meat *or* fish (no gravy)	Medium serving
Vegetables	As luncheon, Grou
Potato, baked *or* boiled	1 small
or mashed	4 tablespoons
Bread:	
Graham, rye, white, whole wheat	1 slice (small loaf)
Butter	2 teaspoons
Fruit	As breakfast list
Cream, light	2 tablespoons
Coffee or tea	
Bedtime:	
Milk	1 cup
Bread:	
Graham, rye, white, whole wheat	1 slice (small loaf)
or Graham crackers	3

Sample Menu.

Breakfast:
Juice of ½ medium-sized grapefruit
4 tablespoons farina
4 tablespoons light cream
2 poached eggs
1 slice Graham toast
2 teaspoons butter
Coffee

Diet No. 2.—(*Continued.*)

Sample Menu.

on:
led beef cake (4 ounces)
l tomato with onion ring
blespoons canned peas
spoons butter
blespoons raspberries (fresh or water-packed)
blespoons light cream

r:
tomato juice
lium serving roast leg of lamb
ge portion of string beans
blespoons mashed potatoes
tuce hearts with mineral oil French dressing
ice bread
aspoons butter
edium-sized orange, sliced
blespoons light cream
fee
nc:
up milk
raham crackers

Diet No. 3.

Approximately—Carbohydrate, 150 grams; Protein, 80 grams; Fat, 100 grams; Calories, 1800.

kfast:	
esh fruit, in season:	
Apple *or* orange *or* peach	1 medium
or grapefruit	½ medium
or blackberries, melon cubes, pineapple cubes, raspberries, strawberries	4 tablespoons
ooked oatmeal *or* farina	4 tablespoons
gg, boiled or poached	1
ilk	1 cup
ead:	
Graham, rye, white, whole wheat	1 slice (small loaf)
tter	2 teaspoons
Coffee or tea	
cheon:	
eat *or* fish (no gravy)	Medium serving (4 ounces)
getables (Group 1) cooked or raw:	
Asparagus, string beans, beet greens, broccoli, cabbage, cauliflower, celery, celery cabbage, chard, chicory, cucumbers, endive, escarole, kale, kohlrabi, lettuce, mushrooms, mustard greens, green peppers, radishes, romaine, sauerkraut, spinach, summer squash, tomatoes, tomato juice, turnip greens, watercress	As desired *Vinegar, lemon or mineral oil dressing may be used with salads*
getables (Group 2) cooked or raw:	
Beets, Brussels sprouts, carrots, eggplant, onions, oyster-plant, canned peas, parsnips, squash, yellow turnips	4 tablespoons
heon:	
ead:	
Graham, rye, white, whole wheat	1 slice (small loaf)
tter	2 teaspoons

Diet No. 3.—*(Continued.)*

Fruit	As breakfast li
Cream, light	2 tablespoons
Coffee or tea	
Dinner:	
Meat *or* fish (no gravy)	Medium serving
Vegetables	As luncheon, G
Potato, baked *or* boiled	1 small
or mashed	4 tablespoons
Bread:	
Graham, rye, white, whole wheat	1 slice (small l
Butter	2 teaspoons
Fruit	As breakfast list
Cream, light	2 tablespoons
Coffee or tea	
Bedtime:	
Milk	1 cup
Bread:	
Graham, rye, white, whole wheat	1 slice (small loa
or Graham crackers	3

Sample Menu.

Breakfast:

Juice of 1 medium-sized orange
4 tablespoons farina
1 cup milk
1 soft boiled egg
1 slice whole wheat toast
2 teaspoons butter
Coffee

Luncheon:

Clear beef broth
Salad plate:
½ cup diced chicken mixed with diced celery and mineral oil mayonn
4 tablespoons grated raw carrots flavored with onion juice, lettuc
1 slice rye bread
2 teaspoons butter
Medium-sized baked apple, with saccharine
2 tablespoons light cream
Tea

Dinner:

Tomato juice
Boiled salmon with lemon juice and chopped parsley
Small boiled potato
Large portion broccoli
Cucumber and watercress salad with mineral oil French dressing
1 slice bread
2 teaspoons butter
½ medium-sized grapefruit
2 tablespoons light cream
Coffee

Bedtime:

1 cup milk
3 Graham crackers

Diet No. 4.

Approximately—Carbohydrate, 175 grams; Protein, 80 grams; Fat, 100 grams; Calories, 1900.

akfast:	
resh fruit, in season:	
Apple *or* orange *or* peach	1 medium
or grapefruit	½ medium
or dlackderries, melon cubes, pineapple cubes, raspberries, strawderries	4 tablespoons
ooked oatmeal *or* farina	4 tablespoons
gg, boiled or poached	1
ilk	1 cup
read:	
Graham, rye, white, whole wheat	2 slices (small loaf)
utter	2 teaspoons
Coffee or tea	
ncheon:	
leat *or* fish (no gravy)	Medium serving (4 ounces)
egetables (Group 1) cooked or raw:	
Asparagus, string beans, beet greens, broccoli, cabbage, cauliflower, celery, celery cabbage, chard, chicory, cucumbers, endive, escarole, kale, kohlrabi, lettuce, mushrooms, mustard greens, green peppers, radishes, romaine, sauerkraut, spinach, summer squash, tomatoes, tomato juice, turnip greens, watercress	As desired *Vinegar, lemon or mineral oil dressing may be used with salads*
egetables (Group 2) cooked or raw:	
Beets, Brussels sprouts, carrots, eggplant, onions, oyster-plant, canned peas, parsnips, squash, yellow turnips	4 tablespoons
Bread:	
Graham, rye, white, whole wheat	1 slice (small loaf)
Butter	2 teaspoons
ruit	As breakfast list
Cream, light	2 tablespoons
Coffee or tea	
nner:	
Meat *or* fish (no gravy)	Medium serving
Vegetables	As luncheon, Group 1
Vegetables	As luncheon, Group 2
Potato, baked *or* boiled	1 small
r mashed	4 tablespoons
Bread:	
Graham, rye, white, whole wheat	1 slice (small loaf)
Butter	2 teaspoons
Fruit	As breakfast list
Cream, light	2 tablespoons
Coffee or tea	
dtime:	
Milk	1 cup
Bread:	
Graham, rye, white, whole wheat *or*	1 slice (small loaf)
Graham crackers *or* soda biscuits	3

Diet No. 4.—*(Continued.)*

Sample Menu.

Breakfast:
Juice of ½ medium-sized grapefruit
4 tablespoons oatmeal
1 cup milk
1 poached egg
2 slices toast
2 teaspoons butter
Coffee

Luncheon:
Bouillon
Baked green pepper stuffed with 4 tablespoons minced ham
4 tablespoons canned peas
Mixed lettuce and watercress salad with mineral oil French dressing
1 slice whole wheat bread
2 teaspoons butter
4 tablespoons orange sections and apple cubes
2 tablespoons light cream
Tea

Dinner:
Celery hearts and radishes
1 slice roast beef
1 small baked potato
4 tablespoons carrots
1 slice graham bread
2 teaspoons butter
4 tablespoons strawberries (fresh or water-packed)
2 tablespoons light cream
Coffee

Bedtime:
1 cup milk or buttermilk
6 saltines

Diet No. 5.

Approximately—Carbohydrate, 200 grams; Protein, 80 grams; Fat, 100 grams; Calories, 2000.

Breakfast:	
Fresh fruit, in season:	
Apple *or* orange *or* peach	1 medium
or grapefruit	½ medium
or blackberries, melon cubes, pineapple cubes, raspberries, strawberries	4 tablespoons
Cooked oatmeal *or* farina	8 tablespoons
Milk	1 cup
Bread:	
Graham, rye, white, whole wheat	2 slices (small loaf)
Butter	2 teaspoons
Coffee or tea	
Luncheon:	
Meat *or* fish (no gravy)	Medium serving (4 ounces)
or eggs	2

Diet No. 5.—(*Continued.*)

…on:	
…etables (Group 1) cooked or raw:	
Asparagus, string beans, beet greens, broccoli, cabbage, cauliflower, celery, celery cabbage, chard, chicory, cucumbers, endive, escarole, kale, kohlrabi, lettuce, mushrooms, mustard greens, green peppers, radishes, romaine, sauerkraut, spinach, summer squash, tomatoes, tomato juice, turnip greens, watercress	As desired *Vinegar, lemon or mineral oil dressing may be used with salads*
…etables (Group 2) cooked or raw:	
Beets, Brussels sprouts, carrots, eggplant, onions, oysterplant, canned peas, parsnips, squash, yellow turnips	4 tablespoons
…read:	
Graham, rye, white, whole wheat	2 slices (small loaf)
…utter	2 teaspoons
…ruit	As breakfast list
…ream, light	2 tablespoons
Coffee or tea	
…ner:	
…eat *or* fish	Medium serving
…egetables	As luncheon, Group 1
…egetables	As luncheon, Group 2
…otato, baked or boiled	1 small
… mashed	4 tablespoons
…read:	
Graham, rye, white, whole wheat	1 slice (small loaf)
…utter	2 teaspoons
…ruit	As breakfast list
…ream, light	2 tablespoons
Coffee or tea	
…time:	
…ilk	1 cup
…read:	
Graham, rye, white, whole wheat	1 slice (small loaf)
or crackers	3

Sample Menu.

…akfast:

… medium-sized peach, sliced
… tablespoons oatmeal
… cup milk
… slices whole wheat toast
… teaspoons butter
…offee

…ncheon:

… slice baked ham
… tablespoons steamed oysterplant
…arge salad of shredded raw cabbage and green peppers with mineral oil dressing
… slices rye bread
… teaspoons butter
… tablespoons honeydew melon cubes with 1 tablespoon fresh lime juice
… tablespoons light cream
…ea

Diet No. 5.—*(Continued.)*

Sample Menu.

Dinner:

Bouillon
2 broiled lamb chops
4 tablespoons mashed potato
4 tablespoons canned peas
Sliced tomato and romaine salad with mineral oil dressing
1 slice graham bread
2 teaspoons butter
4 tablespoons raspberries
2 tablespoons light cream
Coffee

Bedtime:

1 cup milk
6 saltines

Diet No. 6.

Approximately—Carbohydrate, 225 grams; Protein, 80 grams; Fat, 110 grams; Calories, 2200.

Breakfast:

Fresh fruit, in season:	
Apple *or* orange *or* peach	1 medium
or grapefruit	½ medium
or blackberries, melon cubes, pineapple cubes, raspberries, strawberries	4 tablespoons
Cooked oatmeal *or* farina	8 tablespoons
Milk	1 cup
Bread:	
Graham, rye, white, whole wheat	2 slices (small loaf)
Butter	2 teaspoons
Coffee or tea	

Luncheon:

Meat *or* fish (no gravy)	Medium serving (4 ounces)
or eggs	2
Vegetables (Group 1) cooked or raw:	
Asparagus, string beans, beet greens, broccoli, cabbage, cauliflower, celery, celery cabbage, chard, chicory, cucumbers, endive, escarole, kale, kohlrabi, lettuce, mushrooms, mustard greens, green peppers, radishes, romaine, sauerkraut, spinach, summer squash, tomatoes, tomato juice, turnip greens, watercress	As desired *Vinegar, lemon or m eral oil dressing be used with sala*
Vegetables (Group 2) cooked or raw:	
Beets, Brussels sprouts, carrots, eggplant, onions, oyster-plant, canned peas, parsnips, squash, yellow turnips	4 tablespoons
Bread:	
Graham, rye, white, whole wheat	2 slices (small loaf)
Butter	2 teaspoons
Fruit	As breakfast list
Cream, light	2 tablespoons
Coffee or tea	

Diet No. 6.—(*Continued.*)

er:	
eat *or* fish (no gravy)	Medium serving
getables	As luncheon, Group 1
getables	As luncheon, Group 2
tato, baked *or* boiled	1 small
mashed	4 tablespoons
read:	
Graham, rye, white, whole wheat . . .	2 slices (small loaf)
utter	2 teaspoons
ruit	As breakfast list
ream, light	2 tablespoons
Coffee or tea	
time:	
lilk	1 cup
read:	
Graham, rye, white, whole wheat . . .	2 slices (small loaf)
utter	2 teaspoons

Sample Menu.

akfast:
uice of ½ medium-sized grapefruit
tablespoons farina
cup milk
slices cracked wheat toast
teaspoons butter
offee

cheon:
-egg omelette with sauce of stewed tomatoes
mall baked potato
tablespoons canned peas
arge salad of celery cabbage with mineral oil dressing
slices Graham bread
teaspoons butter
medium-sized orange, sliced
tablespoons light cream
ea

ner:
small broiled chicken
small boiled potato
tablespoons sliced beets
sparagus and lettuce salad with mineral oil dressing
slices bread
teaspoons butter
medium-sized baked apple
tablespoons light cream
offee

ltime:
cup milk
graham crackers
teaspoons butter

Diet No. 7.

Approximately—Carbohydrate, 250 grams; Protein, 90 grams; Fat, 130 grams; Calories, 2500.

akfast:	
resh fruit, in season:	
Apples *or* oranges *or* peaches	2 medium

Diet No. 7.—*(Continued.)*

or grapefruit	1 medium
or blackberries, melon cubes, pineapple cubes, raspberries, strawberries	8 tablespoons
Cooked oatmeal *or* farina	8 tablespoons
Milk	1 cup
Bread:	
Graham, rye, white, whole wheat	2 slices (small lo
Butter	4 teaspoons
Coffee or tea	
Luncheon:	
Meat *or* fish (no gravy)	Medium serving (4 ounces)
or eggs	2
Vegetables (Group 1) cooked or raw:	
Asparagus, string beans, beet greens, broccoli, cabbage, cauliflower, celery, celery cabbage, chard, chicory, cucumbers, endive, escarole, kale, kohlrabi, lettuce, mushrooms, mustard greens, green peppers, radishes, romaine, sauerkraut, spinach, summer squash, tomatoes, tomato juice, turnip greens, watercress	As desired *Vinegar, lemon or eral oil dressing be used with sal*
Vegetables (Group 2) cooked or raw:	
Beets, Brussels sprouts, carrots, eggplant, onions, oyster-plant, canned peas, parsnips, squash, yellow turnips	4 tablespoons
Bread:	
Graham, rye, white, whole wheat	2 slices (small loaf
Butter	4 teaspoons
Fruit	As breakfast list
Coffee or tea	
Dinner:	
Meat *or* fish	Medium serving
Vegetables	As luncheon, Grou
Vegetables	As luncheon, Grou
Potato, baked or boiled	1 small
or mashed	4 tablespoons
Bread:	
Graham, rye, white, whole wheat	2 slices (small loaf
Butter	4 teaspoons
Fruit	As breakfast list
Cream, light	2 tablespoons
Coffee or tea	
Bedtime:	
Milk	1 cup
Bread:	
Graham, rye, white, whole wheat	2 slices (small loaf
Butter	2 teaspoons

Sample Menu.

Breakfast:

Juice of 2 medium-sized oranges
8 tablespoons oatmeal
1 cup milk
2 slices whole wheat toast
4 teaspoons butter
Coffee

Diet No. 7.—(*Continued*)

Sample Menu.

...:

..d plate: ½ cup tuna fish with diced celery and mineral oil mayonnaise
..n lettuce and 4 tablespoons cold sliced beets in vinegar
..lices graham bread
..aspoons butter
..blespoons pineapple cubes
.. with lemon

..r:

..ery hearts with radishes
..lice roast beef
..ablespoons mashed potatoes
..ablespoons hubbard squash
..lices rye bread
..easpoons butter
..nedium-sized grapefruit, sectioned
..ablespoons light cream
..ffee

..me:

..up milk
..lices whole wheat toast
..easpoons butter

Diet No. 8.

Approximately—Carbohydrate, 300 grams; Protein, 90 grams; Fat, 140 grams; Calories, 2800.

..kfast:	
..esh fruit, in season:	
Apples *or* oranges *or* peaches	2 medium
or grapefruit	1 medium
or blackberries, melon cubes, pineapple cubes, raspberries, strawberries	8 tablespoons
or banana	1 medium
..ooked oatmeal *or* farina	8 tablespoons
..ilk	1 cup
..read:	
Graham, rye, white, whole wheat . . .	2 slices (small loaf)
..utter	4 teaspoons
Coffee or tea	
..cheon:	
..eat *or* fish (no gravy)	Medium serving (4 ounces)
.. eggs	2
..egetables (Group 1) cooked or raw:	
Asparagus, string beans, beet greens, broccoli, cabbage, cauliflower, celery, celery cabbage, chard, chicory, cucumbers, endive, escarole, kale, kohlrabi, lettuce, mushrooms, mustard greens, green peppers, radishes, romaine, sauerkraut, spinach, summer squash, tomatoes, tomato juice, turnip greens, watercress	As desired *Vinegar, lemon or mineral oil dressing may be used with salads*
..cheon:	
..egetables (Group 2) cooked or raw:	
Beets, Brussels sprouts, carrots, eggplant, onions, oysterplant, canned peas, parsnips, squash, yellow turnips	4 tablespoons
..otato, baked *or* boiled	1 small
mashed	4 tablespoons

Diet No. 8.—(*Continued.*)

Bread:	
Graham, rye, white, whole wheat	2 slices (small l
Butter	4 teaspoons
Fruit	As breakfast list
Milk	1 cup
Dinner:	
Meat *or* fish	Medium serving
Vegetables	As luncheon, Gro
Vegetables	As luncheon, Gro
Potato, baked *or* boiled	1 small
or mashed	4 tablespoons
Bread:	
Graham, rye, white, whole wheat	2 slices (small loaf
Butter	4 teaspoons
Fruit	As breakfast list
Cream, light	2 tablespoons
Coffee or tea	
Bedtime:	
Milk	1 cup
Bread:	
Graham, rye, white, whole wheat	2 slices (small loaf)
Fruit	As breakfast list

Sample Menu.

Breakfast:
1 medium-sized banana, sliced
8 tablespoons oatmeal
1 cup milk
2 slices graham toast
4 teaspoons butter
Coffee

Luncheon:
2 poached eggs on a large portion of chopped spinach
4 tablespoons canned peas
1 small baked potato
2 slices bread
4 teaspoons butter
2 medium-sized stewed apples (with saccharine and nutmeg)
1 cup milk

Dinner:
2 medium-sized veal chops, baked
4 tablespoons mashed potatoes
Large portion string beans
4 tablespoons grated raw carrot on lettuce with mineral oil dressing
2 slices whole wheat bread
4 teaspoons butter
2 medium-sized oranges, sectioned
2 tablespoons light cream
Coffee

Bedtime:
1 cup milk
Bread and butter sandwich:
2 slices rye bread
2 teaspoons butter
1 medium-sized grapefruit, sectioned

Adjustable Diabetic Diets.—Diets outlined in detail, as the fo
going, are important for the guidance and discipline of the avera

Dietary Outline.

Allowed Daily:

Iilk ________________________________

Eggs ________________________________

Ieat, Fish, Cheese ________________________________

Butter ________________________________

Cream ________________________________

Bread ________________________________

Cereal ________________________________

Fruit ________________________________

Apples, apricots (fresh), avocados, blackberries, grapefruit, lemons, limes, loganberries, melons, oranges, peaches, bartlett pears, pineapple, plums, raspberries, strawberries, tangerines, watermelon.

Potato ________________________________

Vegetables ________________________________

Asparagus, string beans, beet greens, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, celery, celery cabbage, chard, chicory, cucumbers, dandelion greens, eggplant, endive, escarole, kale, kohlrabi, leeks, lettuce, mustard greens, mushrooms, onions, okra, oyster-plant, parsnips, green peppers, radishes, romaine, sauerkraut, spinach, squash, tomatoes, tomato juice, turnips, turnip greens, watercress.

Beverage ________________________

Suggested Arrangement of Meals.

kfast:	*Lunch:*	*Dinner:*	*Bedtime:*
uit	Meat, fish or cheese	Meat or fish	Milk
real	One raw vegetable	Potato	
g	One cooked vegetable	One raw vegetable	
ead	Bread	One cooked vegetable	
everage	Fruit	Bread	
eam	Milk	Fruit	
		Beverage	

uctions ________________________________

____

Sample Dietary Outline.

Foods Allowed Daily:

Milk ___ *one pint* ___

Eggs ___ *one or two* ___

Meat, Fish, Cheese ___ *two portions* ___

Butter ___ *with bread and vegetables* ___

Cream ___ *with beverages* ___

Bread ___ *two slices, preferably whole wheat* ___

Cereal *four tablespoons cooked oatmeal or farina or one shredded wheat biscuit* ___

Fruit ___ *three portions* ___

Apples, apricots (fresh), avocados, blackberries, grapefruit, lemons, limes, loganberries, melons, oranges, peaches, bartlett pears, pineapple, plums, raspberries, strawberries, tangerines, watermelon.

Potato ___ *one medium size* ___

Vegetables *as desired, preferably one raw and one cooked at each meal* ___

Asparagus, string beans, beet greens, broccoli, Brussels sprouts cabbage, carrots, cauliflower, celery, celery cabbage, chard, chicory, cucumbers, dandelion greens, eggplant, endive, escarole, kale, kohlrabi, leeks, lettuce, mustard greens, mushrooms, onions, okra, oyster-plant, parsnips, green peppers, radishes, romaine, sauerkraut, spinach, squash, tomatoes, tomato juice, turnips, turnip greens, watercress.

Beverage ___ *coffee and tea as desired* ___

Suggested Arrangement of Meals.

Breakfast:	*Luncheon:*	*Dinner;*	*Bedti*
Fruit	Meat, fish or cheese	Meat or fish	Mi
Cereal	2 Raw vegetable	Potato	
Egg	Bread	2 Cooked vegetable	
Bread	Fruit	Fruit	
Beverage	Milk	Beverage	
Cream			

Instructions ___

(The approximate calculation of this diet is: Carbohydrate, 100 grams Protein, 70 grams; Fat, 100 grams; Calories, 1600.)

ic patient. However, many intelligent patients with mild tes may be trusted with diets which allow more freedom in the ion of meals but confine the amounts of carbohydrate within n range. The following outline can be used when there is ance that the patient understands the principles of a normal Unfortunately this understanding is not as general as it . Many diabetic patients, particularly the elderly, have been of overindulgence in food or the selection of a few foods r than a variety. Consequently it is difficult for them to stand what is meant by a normal diet or an average portion. an intelligent patient may come to some strange conclusions diet is not explained in detail. The general principle of the ing outline is that the amounts of the high-carbohydrate foods pecified and restricted. Other foods are listed and suggestions for their use. Thus an individual diet can be written quickly. e form employed for adjustable diabetic diets is shown on 337. Its use is illustrated on page 338 with a diet which ap-mates 1600 Calories distributed among 100 grams of carbo-ate, 70 grams of protein and 100 grams of fat. It may suffice ave the "Suggested Arrangement of Meals" unaltered and let patient vary the outline as necessity requires. In the beginning, ver, it is desirable to help the patient plan the schedule until ystem is thoroughly comprehended. It may, for example, be tical for the patient to obtain a generous salad at midday but at night in which case the form is corrected to indicate 2 raw tables for lunch and 2 cooked ones for dinner. Since only es of bread are allowed daily, it is suggested that none be taken ight so that a whole slice may be permitted with the luncheon l.

here greater freedom can be permitted, the dietary outline n below is often satisfactory. If at all practicable the dietary dule should avoid an exacting routine. A sense of freedom is icularly inportant in those individuals who inwardly resent nentation of their existence. The detrimental psychologic ts of day in and day out restriction should not be allowed to mulate but should be foreseen by the physician and dissipated re harm is done.

rbohydrate-adjustable Diets With Free Selection of Proteins and . —In the writer's experience many patients do well when only arbohydrates are confined within certain limits and free selec- of proteins and fats is permitted. The following outline has prepared for such patients:

Dietary Outline.

s Allowed Daily:

Meat, Fish, Eggs, Milk, Cheese: may be taken as desired. Sauces, gravies and dressings are excluded.

Butter: with bread and vegetables.

Dietary Outline.—(*Continued*)

Cream: with beverages.

Oil: in salad dressings.

Fruit__________*designate amount for individual diet*__________

Apples, apricots (fresh), avocados, blackberries, grapefruit, lemons, limes, loganberries, melons, oranges, peaches, bartlett pears, pineapple, plums, raspberries, strawberries, tangerines, watermelon.

Vegetables *as desired, preferably one raw and one cooked at each meal*__________

Asparagus, string beans, beet greens, broccoli, Brussels sprouts cabbage, carrots, cauliflower, celery, celery cabbage, chard, chicory, cucumbers, dandelion greens, eggplant, endive, escarole, kale, kohlrabi, leeks, lettuce, mustard greens, mushrooms, onions, okra, oyster-plant, parsnips, green peppers, radishes, romaine, sauerkraut, spinach, squash, tomatoes, tomato juice, turnips, turnip greens, watercress.

Potatoes__________*designate amount for individual diet*__________

Bread__________ " " __________

Cereal__________ " " __________

Beverage__________*coffee and tea as desired*__________

Diets of Modified Consistency.—In cases of gastro-intestinal turbance and in periods following surgery it may be necessary reduce the residue of the diet. The diets which follow are exam of adaptations to fluid and low-residue forms.

Fluid Diet.

Approximately—Carbohydrate, 100 grams; Protein, 70 grams; Fat, 90 grams; Calories, 1500.

Foods Allowed for a Twenty-four-hour Period:

Milk	1½ quarts
Eggs	4
Cream, light	½ cup
Fruit juice: orange, lemon, grapefruit, pineapple	1 cup
Cereal (strained): oatmeal, farina	4 tablespoons
Broth, tomato juice, coffee, tea, as desired	

Sample Menu.

Breakfast:
Gruel:
4 tablespoons strained oatmeal
1 cup hot milk
Coffee with 2 tablespoons cream, light

Fluid Diet.—(*Continued.*)

rning:
p grapefruit juice with 1 egg, well beaten

am soup:
tablespoons puréed spinach
cup hot milk and 2 tablespoons cream, light
asoning
ernoon:
ee milk shake:
cup milk
egg
tablespoons cream, light
offee to flavor
g:
am soup:
tablespoons puréed tomato
cup hot milk and 2 tablespoons cream, light
easoning
:
ible eggnog:
eggs
cups milk
alt, vanilla, nutmeg

e carbohydrate value of this diet may be raised by the addition
uit juices, cereal gruels, and the use of 20 per cent vegetables in
ream soups.

Low-residue Diet.

Approximately—Carbohydrate, 100 grams; Protein, 70 grams; Fat, 90 grams; Calories, 1500.

Sample Menu.

kfast:
up orange juice, strained
ablespoons oatmeal, strained
ablespoons cream, light
oft boiled egg
ffee
norning:
oth with 1 egg, well-beaten
heon:
ablespoons chicken, minced
ablespoons carrots, puréed
easpoons butter
ablespoons apple sauce
a or coffee
fternoon:
up tomato juice, hot or cold
er:
ablespoons fish, flaked
ablespoons string beans, puréed
easpoons butter
up pineapple juice (may be jellied)
ffee or tea
ime:
ilk toast:
1 cup hot milk
1 slice white bread, toasted

Low-residue Diet.

Approximately—Carbohydrate, 200 grams; Protein, 80 grams; Fat, 100 grams; Calories, 2000.

Sample Menu.

Breakfast:
½ cup grapefruit juice, strained
4 tablespoons farina
1 cup milk
1 slice white bread, toasted
2 teaspoons butter
Coffee

Midmorning:
Broth
1 slice white bread, toasted

Luncheon:
2 poached eggs on spinach, puréed
4 tablespoons beets, puréed
2 teaspoons butter
2 slices white bread
4 tablespoons stewed puréed apple, peach or pear
2 tablespoons cream, light
Tea or coffee

Midafternoon:
Tea with lemon

Dinner:
4 tablespoons beef, minced, moistened with broth
4 tablespoons mashed potato
4 tablespoons carrots, puréed
1 slice white bread
2 teaspoons butter
4 tablespoons stewed puréed apple, peach or pear
2 tablespoons cream, light
Coffee or tea

Bedtime:
1 cup milk, hot or cold
1 slice white bread, toasted

Antiketogenic Diets.—In diabetic acidosis, fixed organic fa acids have deprived the blood and tissues of their normal amount alkali reserve. The blood bicarbonate constitutes its alkali rese and is the "first line of defense" against fixed acids. Considera amounts of acids may also be buffered by the plasma proteins a the amino-acids. An unchecked production of abnormal acids eventually deplete body alkali to the point where coma superve and death ensues. "Acetone bodies" or the "ketones" are substances responsible for diabetic coma. These are acetone, ace acetic acid (diacetic acid) and beta-hydroxybutyric acid. Aceto is a volatile substance but the last two are fixed acids and are t chiefly responsible for the acidosis. Much of the acetone is excre through the lungs and gives rise to the characteristic "aceto breath" of acidosis.

These acid bodies are excreted chiefly in the urine so that a di nosis of diabetic acidosis can be readily established or disproved the ordinary urine tests. The degree of acidosis is determined fr both the clinical picture and the carbon dioxide combining powe the blood plasma. Estimation of the carbon dioxide combin power has been, for years, the standard procedure as a guide to

nent of diabetic acidosis. The method of Van Slyke is used t universally to determine carbon dioxide combining-power and that is necessary for clinical purposes. Results are expressed umes per cent or the cubic centimeters of carbon dioxide liber- from 100 cc. of blood plasma. The normal values range from 70. Values between 40 and 50 indicate a mild degree of acido- etween 30 and 40, a moderately severe degree; between 20 0, a severe degree, and under 20 a very severe degree. Clini- the patient becomes comatose when the carbon dioxide com- g-power is in the neighborhood of 30, but at this point can ly be aroused. At 20 the coma is usually profound and the al manifestations such as Kussmaul breathing, dehydration, thready pulse, low blood-pressure and vomiting are usually nt. These low values represent a deficiency of base for com- g with carbon dioxide to form sodium bicarbonate.

the treatment of acidosis there are two main desiderata: (*a*) minate the acetone bodies, and (*b*) to prevent their recurrence. r oxidation can readily be brought about by the injection of ient amounts of insulin and the ingestion or intravenous admin- tion of sugar. The patient should be removed to a hospital, ssible, as the constant use of the laboratory is essential until igns of acidosis are over. Twenty-four hours are usually cient for this purpose. The steps to be taken in overcoming complication of diabetes follow in brief:

he patient should be put to bed and kept warm by the use of kets and hot-water bottles. The stomach should be lavaged a warm weak solution of sodium bicarbonate and a high cleans- enema administered. Urine should be collected immediately every hour thereafter. A 10 per cent solution of pure sterile ose should be prepared at once for use in future emergency. ty per cent sterile glucose in ampoule form is available at t drug stores.) Insulin therapy should be started at the ear- possible moment after the patient is first seen and the diagnosis o longer in doubt. Forty units of protamine-zinc insulin plus nits of unmodified insulin may be given initially, followed by lar insulin in dosage of 20 or more units every hour, so long ugar and acetone appear in the urine. Care must be taken void the serious condition of hypoglycemia. Frequent exam- ion of the urine for sugar and acetone and of the blood for r and CO_2 combining power will be necessary to guide in the ils of procedure. Sugar may be given in the form of orange e or in simple solution in sufficient amounts to insure a slight osuria and hyperglycemia until the acetone bodies have entirely ppeared. It will be noted by this time that the carbon dioxide bining-power, at first very low, has gradually increased to a re which, if not entirely normal, is at least above the danger . When the acetone bodies first disappear, the carbon dioxide re is frequently between 40 and 50.

luids should be forced to combat the dehydration and conse- nt failure of circulation. Since the discovery of insulin it is rarely

essential to give sodium bicarbonate, though it is sometime ployed to hold water in the tissues. Sodium chloride is pro as good for this purpose. In case of persistent vomiting, intrav infusions should be relied upon to force fluids and administe necessary quantity of glucose. An early gastric lavage w much, however, to prevent future vomiting. It is not necessa give solid food the first day. On the second day such food usually be given.

Since the acetone bodies are derived principally from fat essential at first to avoid their use. A moderate amount of pr can usually be given with safety since the protein molecule i final analysis is preponderantly antiketogenic. A diet fulfi these conditions follows. It is low in caloric value and inte for use only for about the first twenty-four hours after the aci has been eliminated. Thereafter a more complete diet shoul substituted.

Antiketogenic Diet.

Carbohydrate–100 g. *Protein–65 g.* *Fat–5 g.* *Calories–*

Breakfast:

Oatmeal or farina, 100 g.
Skim milk, 200 g.
Fruit or fruit juice (6 per cent carbohydrate), 200 g.

Luncheon:

Vegetables (3 per cent carbohydrate), 100 g.
Vegetables (20 per cent carbohydrate), 100 g.
Fish (2 per cent fat), 100 g.
Skim milk, 100 g.

Dinner:

Vegetables (20 per cent carbohydrate), 100 g.
Fish (2 per cent fat), 75 g.
Skim milk, 200 g.
Cooked, unsweetened, fruit flavored gelatin or D-Zerta, 80 g.

Obesity (Prophylactic) Diets.—Reference should be made the section on Obesity for diets suitable for those who are ov weight and apt to develop diabetes.

Practical Suggestions.

1. "**Standardizing**" **the Patient.**—This expression has come mean the regulation of the patient's food intake and insulin dos to effect a proper balance between the two. This must still be the "trial and error" method. Except in acidosis, it is seldom nec sary to hospitalize the patient for this purpose. It has bee the practice of the writer at the beginning to venture a moder carbohydrate diet of about 1800 calories such as has been descri as Diet No. 3, measured. In the average case a trial dose of 20 u of protamine-zinc insulin is then prescribed to be taken once d before breakfast. The patient's urine is next collected at differ

rvals for the first few days and analyzed for sugar and acetone. the patient progresses the diet is adjusted according to the urine blood sugar levels and later according to weight response and ght requirement. Insulin is adjusted likewise in accordance h the needs as evidenced by the urine tests and the blood sugar. er the first two weeks the condition is usually so well in hand t vigilance may be relaxed and the intervals of the patient's visits gthened.

2. **Use of Insulin.**—Most patients probably do better on insulin, n though only small doses are required. Protamine-zinc insulin many advantages and is to be preferred unless undue severity kes the use of supplementary doses of regular insulin necessary. the writer's experience, it is sufficient in the great majority of cases.

Insulin is known to have two effects upon sugars in the body: it reases the oxidation of glucose and increases the glycogen storage. also prevents the formation of excess sugars from other substances. must be given hypodermically, as oral administration is without ect. The degree of reduction of blood sugar per unit varies with individual, and with the dose. In general, smaller doses produce greater effect per unit than larger doses. In prescribing, it is ways safe to calculate that 1 unit should be sufficient to cause the sappearance of 4 grams of urinary sugar, which is about the aximum.

The patient should be taught the symptoms of shock and be structed in their early recognition and treatment. Orange juice sugar will cause prompt cessation of symptoms. If the patient is certain as to when a meal will be served (*e. g.*, banquet, etc.) sulin should be given immediately after the meal. In case of vomng, as in acidosis, it sometimes becomes necessary for the physician administer glucose intravenously or by hypodermoclysis.

It should always be remembered that infections inhibit the effect insulin. This tends to produce acidosis and coma. With an scess, several times the amount of insulin may be required as at her times to keep the patient sugar-free and avoid hyperglycemia. pon drainage of the abscess the former condition may be promptly stored. The patient should always be informed of the danger of y infection and advised to report for observation immediately the event of such a development.

Special syringes graduated in units are available for insulin users, d are much more convenient and less liable to result in error hey should be rinsed and sterilized in distilled water or alcohol. fresh area should be selected for each injection and injections ould be made usually fifteen to thirty minutes before a meal, ough in certain cases a dose between meals, as at 3 or 4 P.M., may em advisable when using regular insulin. Protamine-zinc insulin usually given about one-half hour before breakfast in a single dose r the twenty-four-hour period. This substance liberates insulin owly and gradually over a longer period and thus produces a more iform blood sugar level. Sometimes, however, it must be supemented by crystalline or regular insulin.

3. **Medicines Containing Sugar.**—Large amounts of sugar in cer medicines are sometimes overlooked by the practitioner. C syrups, petrolatum compounds, etc., frequently contain suff amounts to unbalance entirely the patient's metabolism if ta in ordinary quantities. The sugar coating of a tablet is negl but the quantity of syrup in the usual dose of citrate of magn or compound licorice powder can be definitely deleterious.

4. **Should Patients Test Their Own Urine for Sugar?**—Some sp alists of high standing answer this question affirmatively, ot negatively. The writer has seen excellent results either w Some patients manage their own cases efficiently over a long t without the aid of the doctor. Therein lies the danger, howe that the patient will become too independent and finally get i serious trouble. In most cases it would seem better to have patients report occasionally for observation and adjustment and h them forget the urine in the interim between visits. Too frequ alterations of diet and insulin dosage, as so often happens in cases of those who have home laboratories, are not conducive to best results. There are exceptions to this rule, nevertheless, wh self-testing seems both necessary and desirable.

5. **Nervous Factors in Diabetes.**—All practitioners with experien in diabetes have seen the marked exacerbation that follows emotion strain such as apprehension, anxiety, fear or grief. An attempt ameliorate such a mental state will have a most salutary effect up the diabetes. Mild sedatives in small doses are occasionally helpf Whether from emotional disturbance or other reason the juven diabetic is notoriously prone to mercurial fluctuations in blo sugar. For this reason, it sometimes becomes necessary to perm occasional glycosuria in order to guard against the more dangero hypoglycemia.

6. **Care of the Feet.**—Joslin has long emphasized scrupulo cleanliness on the part of the diabetic with special reference to t feet to prevent infection of the skin. The great susceptibility of t diabetic to infection is well known. Joslin claims a much small incidence of infected feet in the Boston area since inauguratin his campaign of cleanliness for diabetics.

7. **Alcohol.**—Alcohol formerly formed a part of the regul therapy of diabetes. It is oxidized with the production of heat an energy. Although not in any sense essential to successful treatmen the occasional use of small quantities in the form of non-sweeten beverages (most distilled liquors) may be permitted.

DIARRHEA

JEROME MARKS, M.D.

It is well-recognized that diarrhea is not a clinical entity but on a symptom of some underlying disease. Often, the determinatio and the treatment of the basic pathology is a matter of considerab time and therefore as a practical consideration the prompt, sym tomatic control of diarrhea is usually called for.

he dietetic management in *acute* diarrhea due to food poisons rritants is handled in much the same manner as "ptomaine ning". It is generally recommended that treatment begin a strong purge; however, this should be used only in the earlier es of an acute enteritis to rid the body of the offending material. n the diarrhea has been profuse and has lasted for some time r to the commencement of treatment, further purgation is hardly ssary. Rather it is better to sooth the irritated bowel. For this ose belladonna (tincture or extract) is to be preferred to opium. latter drug unduly quiets peristaltic activity, may mask symps, and in an occasional case if continued too long it may be the mencement of an addiction. However, opium must occasionally ised, although caution is needed in its exhibition. Along with belladonna, calcium carbonate and/or kaolin in its pure state, s one of the numerous propriety forms, should be employed as adsorbant and protective.

he dietary management proper considers the following factors:

Fluids: Due to depletion of body fluid by the continued bowel vements, insistance upon large amounts of water, or if preferred, k sweetened tea is indicated. If, as often happens, there is an ciated gastritis and vomiting, fluids may have to be administered enterally in which case saline solution (to replace chlorides lost the vomitus) as well as glucose should be used.

Food: For the first twenty-four hours no food need be given vided the fluid loss is corrected. On the second day a diet chosen n toast, strained cooked cereal (oatmeal, farina, cream of wheat), cken or beef bouillion and jello may be instituted. These are best ninistered in small feedings every two hours, since large amounts food may stimulate peristaltic rushes and aggravate the diarrhea. subsequent days lean meat, soft boiled eggs, potatoes, rice, dles or spaghetti with butter, and simple puddings (tapioca, ead, rice), may be gradually added. Since the average case of te diarrhea is of brief duration no further dietary management ndicated.

The management of the *chronic* diarrheas resolves itself primarily accurate diagnosis. This will include a detailed gastrointestinal vey involving the stomach (achylia), small intestines, (sprue, tes, etc.), and the colon (dysenteries, chronic colitis, etc.). In lition, the pancreas, the endocrine system (hyperthyroidism, dison's disease), and the chest (tuberculous enteritis) must also studied. All of these diarrheas must be treated with a diet low roughage and in bowel stimulating food. In short a *strict* bland t is to be followed. This in turn must be adjusted to meet any cific dietary indication which may be present, as for instance in ue, the diarrheas of the deficiency states (pellagra, etc.) and the rrheas associated with diabetes, nephritis and allergy. The ndard bland diet will be found on page 391. From this it will wise to eliminate the fruit and vegetable juices, the stewed fruits l at the commencement even the pureed vegetables. These may cautiously added later and their effect on bowel activity noted.

Despite most detailed investigation the etiology of many of chronic diarrhea will not be determined. Such cases, which be classified either as "functional" or "idiopathic" will also the strict bland diet as outlined above.

It will be noted that this diet is lacking in vitamins B a Since the former is not stored by the body in sufficient quanti protect against prolonged deprivation it is important to intr it as early as possible; doses three to four times the optimal requirements are called for, and since absorption from the ga intestinal tract is uncertain in diarrhea parenteral administra is advised whenever possible. In passing, it may be of intere note that vitamin B deficiency itself (folic acid nicotinic acid), be a cause of chronic diarrhea and thus a double indication adequate diet is called for.

Vitamin C is also lacking in the bland diet and until suffic fruit juices are tolerated should be added as ascorbic acid.

Finally a word about protein. While the bland diets are usu balanced with respect to this substance, the amount absorbe any given case of diarrhea is questionable. In addition to not sorbing protein the body may actually be losing it in the form hemorrhage and exudate in those conditions associated with ulc tion. It is therefore of the greatest importance that the pro requirements of the patient be carefully determined and an atte made to estimate the amount of ingested protein lost in the st It is only with these two factors in mind that adequate provis will be made to secure the patient in nitrogen balance.

DIARRHEA IN INFANTS AND CHILDREN

VINCENT LARKIN, M.D.

Diarrhea is a common symptom of illness in infants and childr The frequency with which it occurs and the mortality result from it have steadily decreased in the past few decades with increa knowledge of etiology and therapy plus improved methods of m sanitation and proper construction of formulas. Diarrhea is s frequently encountered, however, and in certain forms, as epide diarrhea of the newborn, the mortality remains high, approximat 40 per cent in several series of cases. Since it is only a sympto diarrhea may be provoked by a number of causes. The seve and duration vary with the cause, the method of treatment, and preceding condition of the infant. In general, the younger the inf the more serious is the prognosis.

Etiology. A number of pathogenic and saprophytic bacteria known to cause diarrhea, as well as many viruses and toxic irritant substances in the gastro-intestinal tract. A high proport of cases result from contamination of food or water with bacte viruses, or bacterial toxins, as well as direct passage of contagi organisms from other infected patients. Diarrhea may also oc as a symptom of acute appendicitis. Infections outside of the gast intestinal tract (parenteral infections) rarely cause diarrhea if

ke of food is reduced at the onset of the infection (See Acute ctions). Seasonal variation is noted, most cases of diarrhea irring in the summer and fall months, particularly when the perature and humidity are high. These atmospheric conditions bably reduce the tolerance of the infant for food and increase the lency of diarrhea when ordinary amounts of food are fed to nts. Metabolic disturbances may be accompanied by diarrhea, eliac disease, heavy metal poisoning, and food allergies, particu- y allergy to egg, milk, or wheat. Prolonged starvation occasion- produces diarrhea in infants.

Pathology. Examination of the gastro-intestinal tract reveals abnormalities except in specific enteral infections, such as hoid fever, bacterial or amoebic dysentery and chronic ulcerative itis.

Symptoms. Diarrhea may be mild, moderate, or severe, varying m passage of a few mushy or loose stools daily to almost con- uous passage of voluminous watery stools. Color of the stool ries and may be green, yellow, brown, or colorless. Flecks of od are frequently noted in the stool when the diarrhea is mod- tely severe. Large amounts of blood and pus are seen in the ol of patients with bacillary dysentery. Vomiting, abdominal tention, and abdominal cramps often accompany diarrhea. ver is present in some instances, usually when the diarrhea is oderately severe. The degree of toxicity is also variable, from tients not appearing sick to those who are desperately ill or ribund. All combinations of symptoms are seen in infants and ildren at various times. The frequency of the stools, the degree toxicity, and duration of the diarrhea determine the severity and ognosis of the illness.

Pathological Chemistry.—**Dehydration.**—Most important is the creased loss of fluid through the stool, often accompanied by miting or refusal of oral fluids with depletion of the fluid content the extracellular tissues. If the depletion is severe and prolonged, ood volume decreases because of the negative water balance nhydremia). This in turn causes a decrease in kidney function th concentration of the urine, retention of metabolites and reduc- on of ammonia formation.

Acidosis.—Sodium is lost through the stools in excess of chloride ring diarrhea and acidosis results. This acidosis may be increased ketosis when carbohydrate stores have been metabolized and t is burned in large quantities. In addition ammonia production ils and organic acids accumulate in the blood. Recently Darrow s shown that potassium may pass from the intracellular fluid into e extracellular fluid and be lost in the intestinal contents. At nes the potassium may not be lost from the extracellular tissues t sodium may replace it in the intracellular fluids and accentuate e acidosis. Rapoport has shown that calcium is lost from the dy during diarrhea and hypocalcemia may account for the sudden llapse in infants after a severe diarrhea has been brought under ntrol.

Alkalosis.—Persistent vomiting may in rare instances ca greater loss of chloride in the vomitus than loss of sodium i diarrheal stool with resulting alkalosis.

Therapy.—Specific measures should be taken when they available to combat the cause of the diarrhea. In bacillary amoebic dysentery specific chemotherapeutic agents are avail When parenteral infections occur they usually respond to sul mide or antibiotic therapy.

Food allergies may exceptionally result in a mild but persi diarrhea in older children. Egg white, milk, and wheat are the common food allergens. The diarrhea subsides promptly whe offending food is removed from the diet. Rarely should all t items be removed at once from the diet. Such a diet is descr elsewhere, (see Infantile Eczema) but Nutramigen should be stituted in this diet for soybean products since the latter ten cause diarrhea in some patients. Wheat free, egg free, and free diets will be found at the end of this section.

The specific dietary treatment of celiac disease, starch intoler and cystic fibrosis of the pancreas are discussed elsewhere Celiac Syndrome).

Diet Therapy.—**General Considerations.**—Treatment of diarr by diet is aimed first at decreasing and modifying the food int slightly in the case of mild diarrhea to completely in the m severe diarrhea, in order to decrease the quantity of undigeste partly digested food which might act as an irritant to the lo intestines and prolong the diarrhea. Secondly, the total fluid int is increased to maintain a positive fluid balance. A variety of flu may be offered to patients with mild diarrhea, such as water, w tea, boiled diluted milk, small quantities of diluted fruit jui barley water, and clear broth. Older children may also be offe carbonated beverages. Patients with moderately severe diarr may be offered only water, physiological saline solution or weak t Patients with very severe diarrhea require complete oral starvat with fluids administered parenterally by subcutaneous, intraveno intraperitoneal, or bone marrow infusion route.

There seems to be little indication for the administration o cathartic initially in the treatment of diarrhea of any origin. T author has seen several cases of acute appendicitis begin with di rhea as the only symptom, with perforation of the appendix result from the routine administration of a cathartic. Other medicati in common use for the treatment of diarrhea are paregoric, ap powder, tomato powder, and various preparations containing pec Paregoric is rarely of value in decreasing the diarrhea and is cont indicated if abdominal distention is present. Apple powder, tom powder, and pectin preparations appear to be of definite value treatment of mild diarrheas of older infants and children but doubtful value in severe diarrheas and in the diarrheas of sm infants.

Treatment of Mild Diarrhea.—**Breast Fed Infants.**—If the diarrh is very mild, it usually comes under control promptly when

ntity of breast milk taken is reduced. This is simply achieved offering a few ounces of boiled water or weak tea immediately re a feeding and by shortening the nursing time to five minutes 3 to 4 feedings. If the diarrhea is of moderate severity it is sable to omit 2 breast feedings entirely, offering only boiled r or weak tea every three to four hours. Then, the infant be offered the breast for five minutes after taking some water he following twenty-four to forty-eight hours. As the diarrhea es under control normal breast feeding may be resumed. The nt rarely cries with hunger during this period since the appetite tolerance for food are generally reduced during the period of rhea.

rtificially Fed Infants.—If the diarrhea is very mild it may be dily controlled by the elimination of added carbohydrate from the mula. If the infant is receiving whole milk, the milk should be ed for five minutes and diluted $\frac{1}{3}$ with water, that is, 1 ounce vater for each 2 ounces of milk offered. In addition the infant be given water, tea, and diluted fruit juices. This period of tial starvation may be continued for twenty-four to forty-eight rs depending on the return of the stools to normal. Moderately ere diarrheas require the elimination of all fluids by mouth except ter and tea for eight to twelve hours. If the diarrhea abates on s regimen, the infant may be offered skimmed milk which has n boiled for five minutes and diluted with $\frac{1}{3}$ water for an addition- twelve to twenty-four hours. Other foods may then be added dually, if previously given, in the same order in which they were rted in infancy. (See Artificial Feeding).

Treatment of Diarrhea in Older Children.—Diarrhea in older ldren is usually due to gastro-intestinal infection or dietary in- cretions. It is often accompanied by considerable vomiting. hydration and electrolyte disturbances are rarely of clinical im- tance in these children and do not require specific therapy for rection as they do in infants. If the vomiting is severe even fluids st be withheld for a few hours. The patient may then be per- tted sips of water for the next three to four hours and this may followed by carbonated liquids such as gingerale, pepsicola, and a cola. This period of starvation also tends to bring the diarrhea der control at the same time. Cathartics are contraindicated ause of the occasional occurence of acute appendicitis in the es. The pectin preparations, such as Koapectate, are of con- erable value in this type of diarrhea as they help bring the rrhea under control. The quantity to be offered depends upon severity of the diarrhea and the age of the child. Foods like eal, bread, rice, and boiled milk may generally be started after nty-four hours and a return to normal diet made in two to ee days.

Severe Diarrhea in Infants. Severe diarrhea is considerably re dangerous in infants than it is in older children because of ease with which infants develop dehydration. The dehydration ich develops in infants with severe diarrhea is accompanied by

extensive changes in the electrolytes of the body including in cellular and extracellular ions as well as those of the blood. Sodi is lost in considerable excess of chloride in diarrhea, usually i ratio of 3:2. Potassium loss from the stools is considerable and loss may equal $\frac{1}{4}$ of the entire body content of potassium. addition the intracellular deficit of potassium may be increa when the diarrhea has been brought under control by replacem by potassium in the cells with sodium. The acidosis which acco panies diarrhea mobilizes calcium from the bones and results i loss of calcium from the body by way of the stools, the amou lost being proportional to the duration and severity of the acid which accompanies the diarrhea. When the diarrhea has be brought under control and the acidosis overcome (post-acid state) calcium may be suddenly withdrawn from the blood into t bones and a significant degree of hypocalcemia may develop.

We are indebted to Darrow, Rapoport and their co-workers f the recent vital studies on the significance of potassium, calciu phosphorus, and phosphatase deficits in severe diarrhea and in t post-acidotic state. The mortality from severe diarrhea is signi cantly lower when potassium chloride is added to the water a salt solution which is ordinarily administered to overcome dehydr tion and acidosis. Severe dehydration may be associated with hig levels of potassium in the blood and potassium therapy must withheld for a few hours until the dehydration has been partiall overcome. Similarly if urine secretion is scanty potassium therap must be withheld until renal function has been re-established b administration of a physiological saline solution intravenously subcutaneously. There is little danger of potassium intoxicatio developing if the kidneys are functioning and the more severe degre of dehydration has been overcome. The toxic level of potassium i the blood is 10 to 12 mm. Slow administration of potassium (8 t 12 hours) in the dosage recommended by Darrow should produc no danger of potassium intoxication (bradycardia or cardiac stand still) if renal function is normal. The antidote for potassium in toxication is calcium given intravenously. According to Rapopor calcium salts should not be given intravenously in combinatio with dextrose solutions because of the danger of necrosis of tissu in the vicinity of the vein injected with such a solution.

Severe diarrhea has been divided into 2 phases by Rapoport an his co-workers:

1. Acidosis and dehydration during the period of diarrhea wit loss of water and intracellular and extracellular electrolytes
2. A post-acidotic state after subsidence of the diarrhea an correction of deficits of water and extracellular electrolytes with rapid up-take of intracellular electrolytes by the de pleted soft tissues and bone and depletion of the electrolyte from the blood.

In addition to the loss of potassium as demonstrated by Darrow Rapoport and his co-workers have shown that there is a simila depletion of calcium, phosphorus, and phosphatase from the bloo

e post-acidotic phase. The loss of extracellular electrolytes is rtional to the loss of extracellular fluids during the diarrhea. oss of calcium from the body during the diarrhea is proportional e duration and severity of the acidosis. The loss of potassium rtly proportional to the degree of destruction of the cells, partly e decrease of the volume of the intracellular fluid. The deficit ood calcium in the post-acidotic state is increased by the poor rption of calcium by the gastro-intestinal tract and the increased drawal of calcium from the blood into the bones. The rapid ake of calcium by the bones in the post-acidotic state results in creased utilization of phosphatase and a decrease of phosphatase e blood.

he post-acidotic state has been described by Rapoport and the cal findings are related to the deficit of calcium in the blood. nges in the infant as a result of hypocalcemia in the post-acidotic e may be divided into 4 groups:

Changes in neuromuscular function, with convulsions, spasticity, carpopedal spasms, and nystagmus.

Changes in autonomous functions, with irregular respiration, bradycardia, circulatory collapse, abdominal distention, pallor and cyanosis.

Changes in hydration and regularity of temperature, with edema and fever.

Hemorrhagic manifestations, with hematemesis, hematuria, blood in the stools and intracranial bleeding.

ailure to anticipate or treat the post-acidotic state may result death or permanent cerebral damage to the infant after the rhea has been successfully brought under control.

Ianagement of Severe Diarrhea.

. Oral feeding should be eliminated until the diarrhea has been brought under control. This period may last from one day to one week. Occasionally in some cases of epidemic diarrhea of the newborn, the diarrhea may persist for some weeks and oral feedings may have to be withheld for that period.

. Whole blood transfusion may be required if the patient is in shock. This may be given immediately on admission to the hospital if the condition of the infant is poor. The amount of blood recommended is 20 ml. per kilogram of body weight plus an equal volume of physiological saline.

. Water, glucose and electrolytes are given parenterally (intravenous, subcutaneous, bone marrow or intraperitoneal) during the first twenty-four hours of therapy in amounts calculated to overcome dehydration and acidosis and make up the electrolyte deficit. This may be achieved by administering 80 to 150 ml. per kilogram of Darrow's solution plus sufficient 5 per cent glucose solution to make the total fluid intake 150 to 280 ml. per kilogram of body weight in twenty-four hours. Darrow's solution may be made by either of the following formulas:

KCl	2 grams	KCl	2 gr
NaCl	3 grams	NaCl	3 gra
Molar sodium lactate	40 ml.	⅙ Molar sodium lactate	250
Water	710 ml.	Water	500

After the first twenty-four hours, Darrow's solution may be g parenterally in amounts from 20 to 50 ml.-kg. with the total volume made up to 150 - 200 ml. per kilogram of body weigh addition of 5 per cent glucose solution. This is continued as as the patient passes loose stools.

If the diarrhea is prolonged beyond one week, it may be advis to substitute an amino acid preparation (Amigen - Mead John for the glucose solution in order to maintain nutrition. Am may be given intravenously in quantities of 100 to 200 ml. kilogram of body weight. Five hundred ml. of Amigen supplies calories and 1 gram of NaCl.

When the diarrhea has come under control, oral feeding may begun. As long as the oral feeding supplies less than 70 cal-kg. 2 grams of KCl should be added to the feeding. When the feeding is adequate to maintain nutrition, the added KCl may discontinued since ordinary formulæ contain adequate potassi

Calcium therapy should be begun as soon as the patient be to pass from the acidotic to the post-acidotic state, for pro timing may eliminate the hazards of the latter. Close observat of the condition of the patient, chemical changes is the blood, a decrease in the frequency of stools often point to the shift to post-acidotic state. Unless the diarrhea is recurrent, calci chloride is used and should be given in doses of 3 to 4 grams da for two to five days, then reduced to 2 grams daily. Large infa may require a larger dose; premature infants require only 2 gra daily. The calcium chloride solution should not exceed 5 per c concentration, and more dilute solutions are preferable. For travenous administration the solution should not be stronger th 1 per cent.

Oral feeding may be started cautiously when stools have b normal for twenty-four to forty-eight hours. Sterile water sho be offered every three to four hours in small amounts (4 ml.) doubl the amount offered at the previous feeding if there is no vomit or recurrence of diarrhea. After twenty-four hours a dilute feed may be offered, containing 10 cal-kg. and diluted to contain 150 water per kilogram (2½ oz.-lb.). If part is refused, the fluid int is supplemented by parenteral administration of 5 per cent gluc in physiological saline. As noted previously 1 to 2 grams of K are added to the feeding. The caloric intake is gradually increa to normal over a period of one to two weeks.

Formulas that are satisfactory for the initial oral feeding infants with diarrhea should be low in fat, preferably are acidif and easily digested. A number of such preparations are availa Powdered acidulated protein milk (Mead Johnson, Merril-So S M A) or powdered skim lactic acid milk (Mead Johnson, Mer Soule) are satisfactory. Their composition is described elsewh (Proprietary Milks for Infant Feeding).

mple: Infant 4.0 kg. (9 lbs.)
Fluid intake, 4 kg. × 150 ml. = 600 ml. (20 oz.)
Caloric intake, 4 kg. × 10 cal. = 40 cal. = 8 gm. (1 tblsp.)

Days of Oral Feeding	1	3	5	7	9	11–14
[1]P.P.M.	1	2	4	6	8	10
[2]Water	20	20	20	20	20	20
Cal. per pound	44	9	18	27	36	45
	1	3	5	7	9	11 14
*P.P.M.	8	16	32	48	64	80
**Water	600	600	600	600	600	600
Cal/kg.	10	20	40	80	100	120

[1]Tablespoonfuls of Powdered Protein Milk
[2]Ounces
*Grams of powdered protein milk
**Ml.

Wheat Free Diet

llergic to Wheat Alone, Foods Permitted Are:

rages
ocoa, fresh or bottled fruit juices, mineral or carbonated waters

ads
iscuits or breads (made without wheat), corn bread or corn pone, atmeal or potato muffins, rice, Ry Krisp and rye

als
arley, barley flour, corn flakes, corn meal, cornstarch, potato our, rice flakes, rolled oats, rye and tapioca, or Ry Krisp wafers, rumbled and served with cream and sugar

s
Baked, coddled, deviled, escalloped, fried, hard or soft boiled, oached, omelets, baked, custards, scrambled

s
Butter, meat, poultry or vegetable fats, olive or other salad oils nd oleomargarine

its
All kinds, raw, canned or plain cooked with sugar, honey or syrups

ats
All meats may be eaten if they are not prepated with wheat products. Do not use ready-prepared meats, such as cervelat, hamburger, meat loaf, and sausages, as they frequently contain wheat products as fillers.

lk and Its Products
Butter, buttermilk, cheese, cream, evaporated milk, ice cream nd sherbets

stries and Other Desserts
Bavarian cream, cornstarch pudding, fruit gelatins, homemade ces or ice creams, oatmeal, rice or rye cookies, tapioca pudding, Indian pudding, Ry Krisp, pastry and candied Apple Betty

ultry and Game
Do not use wheat products in preparation.

Seafoods
Use no wheat products in preparation.

Soups
Homemade cream, meat and vegetable soups

Sugars
Brown, granulated, powdered, confectioner's and maple. H
made jellies, jam preserves, and candies.

Vegetables
All kinds, canned, cooked or raw. Add only butter, mil
cream in preparation.

If Allergic to Wheat Avoid:

Beverages
Cereal beverages make from wheat

Breads
Hot breads, such as muffins, popovers, baking powder bis
make with wheat products, griddle cakes, waffles, doughnuts

Wheat Breads
This will include the following:
- Corn bread
- Crackers of all kinds (does not include Ry Krisp)
- Gluten bread
- Graham bread
- Pretzels
- Rye bread
- White bread
- Whole wheat bread
- Cracker Crumbs
- Cracker meal
- Graham flour
- Macaroni
- Noodles
- Spaghetti
- Vermicelli
- Bread Crumbs
- Buckwheat

Wheat flour in any form—whole wheat, graham or white or
mixture of grain flour that may have wheat content.

Desserts and Pastries
Cakes, cookies, boiled custards—unless thickened with eggs
cornstarch, dumplings, puddings, pies and pastries of all ki
—unless made without wheat products.

Miscellaneous
Gravies and cream sauces which are thickened with wh
products
Malt products
Yeast cakes

Note:
Be very careful not to use any of the wheat products to thic
sauces, gravies, or other foods. Do not use flour or bread cru

ain juices of meat about to be cooked. In short, ascertain er or not there is any possibility of the presence of any wheat cts anywhere in your food, as the most minute amounts are lesome.

Egg Free Diet

ergic to Eggs Alone, Foods Permitted Are:

ages

coa, fresh or bottled fruit juices, mineral or carbonated waters

ds

Krisp, corn pone; most breads which are bought have eggs them or are brushed with egg white to glaze the tops.

ls

rley, barley flour, corn flakes, corn meal, cornstarch, potato ur, rice flakes, rolled oats, rye and tapioca

tter, meat, poultry or vegetable fats, olive or other salad oils, d oleomargarine

ts

l kinds, raw, canned or plain cooked with sugars, honey or syrups

Ice Creams, Sherbets and Candies

ade at home without the use of eggs, or foods containing eggs— listed below.

ts

l kinds, not prepared with eggs

and Its Products

utter, buttermilk, cheese, cream, evaporated milk, ice cream d sherbets

try and Game

o not use egg products in preparation.

d Dressing

ade at home without the use of eggs.

oods

se no eggs in preparation.

os

omemade, cream, meat and vegetable soups.

ars

rown, granulated, powdered, and maple. Homemade jellies, ms, preserves, and candies

etables

l kinds, canned, cooked or raw. Add only butter, milk or eam in preparation. *Do not combine with eggs.*

llergic to Eggs, Avoid:

Dishes

ds containing eggs, such as

aked	Coddled	Creamed
eviled	Egg drinks	Egg sauces
scalloped	Fried	Egg whips

Foods containing eggs, such as—(*Continued*)

Omelets	Poached	Hard or soft coo
Shirred	Meringues	Noodles
Pretzels	Puddings	Spanish cream
Timbales	Waffles	Custards
Doughnuts	Fritters	Griddle cakes
Macaroons	Marshmallows	Malted cocoa dri
Mayonnaise		

Bread foods in which the adherent used has been an egg mixt
Baking powders, except Royal
Cakes and cookies, unless homemade without eggs
Frostings, unless homemade without eggs
Ice cream, unless homemade without eggs

Note:

This list points out the foods most likely to be used. Do not eggs in any way, either as such or as an ingredient in a prepa food. Do not clear soup with eggs. Use the utmost caution choosing foods which are purchased prepared. to be sure that t have no egg content.

Milk Free Diet

If Allergic to Milk Alone, Foods Permitted Are:

Beverages

Cocoa, made with water—without milk or cream. Fresh bottled fruit juices, mineral or carbonated waters.

Breads

Ry-Krisp, corn pone, and others in which there are no da products.

Candies

Homemade with water, such as fondant, molasses taffy, Fren paste and divinity

Cereals

Any cereal served without milk or cream

Eggs

Baked, coddled, deviled, escalloped, fried, hard or soft cook poached, omelets, scrambled
Do Not Use Milk or Butter in Their Preparation.

Fats

Poultry, vegetable or meat fats, olive or other salad oils. Use t oleomargarines that you are certain do not contain any of t butter fats. (Some commercial brands are churned in milk).

Fruits

All kinds, raw, canned or plain, cooked with sugar, honey or syr without milk or cream.

Ices

Fruit ices made with water (Do not use prepared brands).

Meats

All meat may be eaten if not prepared with dairy products

s

not use any product in soup such as noodles, that may contain any of the dairy products.

llaneous

pcorn, potato chips, raisins, and salad dressings (if made at me without the addition of dairy products).

ies

okies, cakes, pie crust, puddings and shortcake made without iry products.

es

l kinds

try and Game

not use dairy products in preparation.

l Dressing

ade without dairy products, such as French dressing or mayonise.

l Permitted

oods

e no dairy products in preparation.

ps

omemade meat and vegetable.

ars

rown, granulated, powdered, confectioner's, and maple. Homeade jellies, jams and preserves. Honey and preserves prepared ithout the use of dairy products.

etables

ll kinds, canned, cooked, raw. Do not add butter, milk or eam in preparation.

llergic to Milk, Avoid:

erages

hocolate or cocoa as a beverage (unless make with water), alted milk.

ads

ot breads, such as muffins, popovers, baking powder biscuits, iddle cakes, waffles, doughnuts, unless prepared without milk other dairy products.

eat Breads

ich as: White bread, whole wheat bread, rye bread, graham, nless prepared without milk or other dairy products.

dies

nless you are certain they do not contain dairy products.

erts

akes and cookies (containing dairy products)

e cream, milk or other cream sherbets, puddings, and sauces, ch as hard sauce.

es Prepared With Milk

oiled salad dressing, creamed foods, custards, escalloped dishes,

Dishes Prepared With Milk—(Continued)

foods prepared au gratin, gravies, cream or other dairy p ucts, milk or cream sauces, omelets, or scrambled eggs, rare soufflés, timbales.

Soups

Bisques, chowders unless made with water, milk or cream so

Dairy Products

Butter, buttermilk, cheese, condensed milk, evaporated or d milk, cream, curd, ice cream and sherbets, milk—whole skimmed, powdered or malted milk (whey).

Oleomargarine

If churned in milk.

Note:

Do not cook with any of the forbidden foods listed above. purchasing ready prepared food products, be sure that they do contain dairy products. If you are not absolutely certain, cons your physician.

DIPHTHERIA

Vincent Larkin, M.D.

Diphtheria is an acute infectious disease usually involving t nasopharynx and caused by C. diphtheriae. The infection localized to the tissue which harbors the diphtheria bacillus, bu powerful toxin is elaborated at the site of infection and absorb into the circulation. The disease is variable in its severity accordi to the pathogenicity of the organism and the degree of resistan of the patient. The amount of diphtheria in a community var inversely with the number of immune people in the community. occurs most frequently during the cold months and is most freque in children.

The most common site of diphtheritic infection is the pharyn Less common is laryngo-tracheal diphtheria, and least common nasal diphtheria. A necrotic pseudo-membrane forms on the i fected area and extends rapidly over the adjacent mucous membran Fever is moderate. Cervical adenopathy is usually considerab As the toxin is absorbed into the circulation toxemia becom apparent. In the more severe cases capillary fragility is increas and hemorrhages occur. Involvement of the larynx by the dip theritic membrane may cause an obstruction to respiration whi can be fatal.

Complications include bronchopneumonia, atelectasis, myocar tis, peripheral neuritis, peripheral circular collapse, muscle paraly particularly palatal paralysis.

Diet.—It is obvious that the patient is generally too ill to ta other than fluids and in cases of laryngeal obstruction of pala paralysis it may be necessary to pass a nasal catheter into t stomach in order to continue feeding.

The patient who has had a laryngeal intubation may requ tube feeding initially, but generally becomes capable of swallowi

s when he is accustomed to the tube. Not infrequently fluids t be administered parenterally.

s soon as the patient is able to take solid food, the nutritional irement must be considered, particularly the vitamins. A high ric soft diet should be offered. Thiamin chloride and ascorbic should be administered in large quantities from the onset use of the tendency to hemorrhage and peripheral neuritis. n there is evidence of myocarditis 10 or 20 per cent glucose ld be given intravenously daily.

DYSENTERY, AMEBIC.

iscussion.—The incidence of amebic dysentery is far greater n is popularly accepted. A recent mild epidemic—because of warnings to the physicians at large—has brought to light a great nber of cases which would otherwise have gone undetected. In ry case of intermittent diarrhea an amebic etiology should be sidered.

he impression that this condition is pretty well restricted to the tern nations and the various subtropical countries has been nonstrated to be a fallacy.

)ietetically, the management of this type of condition is very nilar to that prescribed under mucous colitis. It has been pointed t that in addition to this diet regimen there should be a limitation sugar. In view of the fact that the majority of these cases do t present a severe anemia and emaciation, as depicted in ulcerae colitis, the infiltration of foods high in protein is not specifically licated.

As a general rule, the diet for the second stage of mucous colitis n frequently be employed.

Typical Menu.

eakfast:

Strained fruit juice
Strained cooked cereal with cream and sugar
Egg, except fried
Toast with butter
Coffee with cream and sugar

ncheon:

Choice: minced meat, fish, egg *or* cheese
Puréed vegetables
Bread and butter
Choice: apple sauce, mashed ripe banana, puréed apricots, peaches, pears *or* prunes
Milk *or* tea with lemon

inner:

Strained soup
Minced meat *or* fish
Potato, baked *or* mashed

Typical Menu—(*Continued.*)

Dinner—Continued.
Puréed vegetable
Bread with butter
Simple dessert
Milk *or* coffee with cream and sugar

NOTE.—Sugar should be used sparingly.

Suggestions.—Reference should be made to Foods Lowes Roughage, Fluid Foods, Bland Foods and Soft Foods for additio items to be used in the menus. Further menus can be found un Irritable Colon and Ulcerative Colitis.

In the management of acute attacks of amebic dysentery, vari writers concur in the institution of a starvation period of two three days with the patient in bed. During this period, the ministration of water, fruit juices, broth, bouillon, weak tea or co is indicated. Following this stage, various gruels can be administer but it is considered good practice to leave out milk for the first f or six days. After this regimen, a return to the previously no dietary is in order.

ECLAMPSIA.

Refer to page 416.

ECZEMA AND NEURO-DERMATITIS.

Refer to page 291.

ENURESIS.

VINCENT LARKIN, M.D.

Discussion.—Along dietetic lines it has been brought out th certain foods and drinks have a profound influence upon enures These are coffee, tea, cocoa and spirituous liquors. Spirituo liquors are given to children of various races under the impressi that "they are healthful." Italian children receive wine very earl German children, beer, and Jewish children receive wine duri certain holidays. Enuresis has been attributed to the diuret action of alcohol, caffein and theobromine, found in these foo There are numerous cases that have been cured merely by t withdrawal of coffee or tea and in some instances wine. The auth has seen a case of recurrent enuresis in a Jewish child that remain dormant for a year, and then started during the holidays due the imbibing of wine.

In addition, it is believed that in certain children the bladd innervation is not well developed, but sufficiently so to hold normal night output of urine. If in these children, a little mo than the normal night output is added, enuresis results. To ove come this, the child is stopped from drinking four hours bef

me, and evacuation is demanded prior to retiring. This four- interval should certainly be more than sufficient to allow the ys to secrete the remainder of the day specimen. This treat- , if rigidly and firmly carried out, may be aided by other ures. The following procedure has been found to be of practical :

No coffee, tea, cocoa or spirituous liquors.

No fluids of any nature four hours before retiring.

Hydrotherapy, a cold friction rub of the chest, sides and lumbar , is sometimes helpful in older children in order to relieve the remia and congestion of the internal organs.

Elevate the foot of the bed 1 or 2 inches from the floor. This ne to allow gravity to relieve urinary pressure on the trigonum, h pressure in itself may act as an irritant and stimulus.

Try to have the patient sleep on the right side and not on the k. The theory is that congestion of the spine results from the er and is avoided in the former. This can be accomplished by bi's simple method of tying a towel around the patient with a t at the back.

. Hands should be kept above the coverings, in order to prevent conscious friction of the genitalia.

. Atropine sulphate by mouth, is frequently found to be of ie. It helps to relieve any vesicular irritation or spasm. A gested method of administration is as follows:

℞	Atropine sulphate	0.0325
	Aq. dest. q.s. ad	15.0000

M. et Sig.: gtts as directed.

)ne drop of the above solution is equivalent to $\frac{1}{500}$ grain of opine. Start by giving 1 to 3 drops, three times a day, increas- 1 drop in twenty-four hours, until the desired result is obtained. hould not be forgotten, however, that while the patient is taking atropine, great caution must be observed to note the symptoms tropine poisoning, disturbances of vision, tachycardia, dry mouth l rash.

f the enuresis is of psychologic origin, the diet and rules will be naterial benefit, but if caused by a local or focal cause, the diet will of no assistance until this focus has been removed.

n planning a diet, another factor that may be of some assistance ising a salt-free or salt-poor diet wherever possible, to diminish ural thirst. The dietary details can be found elsewhere.

EPILEPSY.

George A. Blakeslee, M.D.

Discussion. The term, epilepsy, is derived from the Greek mean- "seizure" and is one of the oldest known diseases. The modern ef is that this disease is a symptom of some underlying physical turbance rather than an entity in itself.

Among the propounded etiologies are heredity, birth injur postnatal traumatisms, brain tumors and cysts, infections, gla lar imbalances, etc. Each of the suggested etiologies is capabl presenting startling illustrations of cures when measures have b taken to eradicate or correct the proved fault. However, with respect to the amount of work which has been done on this dise no one etiology has been determined for any great percentag cases. The term, idiopathic epilepsy, a cloak for our ignora still flourishes.

A multitude of diets of both bizarre and scientific nature h been evolved. Each diet has had its adherents, but the major of the diets have not withstood the test of time. Fundamental aside from any dietetic changes directed specifically at the disea a well-balanced diet consisting of the proper proportions of car hydrate, fat, protein, mineral salts, vitamins and fluid intake is t one of choice. Correction of such conditions as constipation, commonly associated symptom of epilepsy, ptosis, atonicity, anem etc., should be conjointly effected.

During the past decade several diets offering results in epilep have been advanced. Chief among these is the ketogenic diet.

It was observed by Wilder that children who were subject epileptic seizures ceased the attacks when undergoing starvatio It was recognized that starvation produced an acidosis with a associated ketonuria, lowered blood CO_2 combining power and a alteration in the H^+ concentration. It was thought that the produ tion of this acidosis acted with a sedative effect and thereby pr vented the convulsive seizures.

Talbot expresses the opinion that the acidosis produces its effe probably by renal stimulation and thus increases the fluid outpu establishing thereby a condition of relative dehydration.

Bearing in mind the apparent efficacy of dehydration as exhibite by cases of acidosis, the ketogenic diet was formulated. As far bac as 1769, Stark showed that diets high in fat and low in carbohydrat have a dehydrating effect. This observation has been repeatedl confirmed by other investigators. The continuation of a ketogen diet alters the general metabolism with the resultant diminutio of tissue fluids. The time-worn slogan that "fat burns in a carbo hydrate flame" is still invariably true. The ketogenic diet is on in which a disproportionately high amount of fat in relation to minimum amount of carbohydrate is ingested. The result of th diet—due to faulty combustion of the excess of fat—is ketosis.

Further details in reference to acidosis can be found und Diabetes Mellitus.

It is questionable whether the results accompanied by the die are due to dehydration, acidosis or some unknown or unrecognize factor.

In his management of epileptic cases subjected to the ketogeni diet, the author generally maintains a further restriction of liquid In this way the patient not only is subjected to dehydration b the diet but also by limitation of fluids.

Typical Menu.

	Amount.	
kfast:	*Quantitative.*	*Household.*
Eggs	2	2
Bacon, cooked	25 grams	4, 7″ strips
Cream	55 cc.	Scant $\frac{1}{4}$ c.
Butter	20 grams	4 t.
Bread	25 grams	1 slice
6 per cent fruit	70 grams	$2\frac{1}{2}$ oz.
cheon:		
Meat	70 grams	$2\frac{1}{2}$ oz.
3 per cent vegetable	135 grams	$\frac{2}{3}$ c.
Potato	40 grams	$\frac{1}{2}$ medium
Cream	45 cc.	$\frac{1}{5}$ c.
Cheese	15 grams	2″ x $1\frac{1}{2}$″ x $\frac{1}{2}$″ slice
Bread	15 grams	$\frac{1}{2}$ slice
Butter	25 grams	5 t.
nner:		
Meat	40 grams	Scant $1\frac{1}{2}$ oz.
3 per cent vegetable	135 grams	$\frac{2}{3}$ c.
Bacon, cooked	15 grams	2, 7″ strips
Cream	40 cc.	3 T.
Cheese	15 grams	2″ x $1\frac{1}{2}$″ x $\frac{1}{2}$″ slice
6 per cent fruit	50 grams	$\frac{1}{4}$ c.
Bread	20 grams	1 thin slice
Butter	30 grams	2 balls

tras:

(One-third to each meal) Olive oil, 90 cc.; lemon juice, 50 cc.

renoon:

Olive oil, 30 cc.; lemon juice, 15 cc.

mmary:

Fat, 260 grams; carbohydrate, 80 grams; protein, 80 grams; lories, approximately 3000.

Modified Cuneo Diet.

Another diet is used as a result of the work of Cuneo, an Italian estigator. He names the proteoses as the convulsion-producing bstances in epilepsy. A defect in the alkalinization function of the all intestine and liver in the process of carbohydrate metabolism s in some way upon the components of the blood and, under tain conditions, liberates the substances which cause the con-lsions, namely, the proteoses, according to Cuneo.

An organic acidosis is produced in the epilepsies, and the cause this acidosis was thought to be in the first phase of the metabolism starch substances, that is when starch is transformed into mal-

tose. Since 1917, when these therapeutic experiments were begun, a special diet was ordered and restricted in the amou carbohydrates. This, combined with the administration of an a by mouth has apparently given very encouraging results. It thought that the factor of importance in epilepsy was the acid regardless of whether this depends on a viciously functioning ca hydrate metabolism which causes a general toxicosis, or upon local production of the toxic substances from disintegrating cell structures in the blood stream and secondary to vascular dist ances. This diet restricts carbohydrates and the administratio alkalies by mouth.

In a 3000 Calorie diet the protein content should be at leas grams which will provide approximately 280 Calories for an i vidual weighing about 150 pounds. This provides protein at ratio of 1 gram per kilo (2.2 pounds) of body weight. The rem ing calories should be obtained from equal caloric amounts of and sugars. This requirement will necessitate the use of about grams of carbohydrates and 150 grams of fats. In this diet it is that the body must use the sugar needed in the breakdown of proteins and possibly also the fats, so that these two essent must be built up in the diet and the carbohydrates diminished. T fluid intake is not restricted.

For this diet the following foods are suggested:

Advised.

Fruits.
Apricots
Figs
Grapefruit

Grains.
Dietetic bread
Dietetic flour
Graham bread
Whole wheat bread

Milk and Dairy Products.
Butter
Buttermilk
Cheese
Cottage cheese
Cream
Koumiss
Oleomargarine
Sweet milk
Zoolak
Eggs

Fruits.
Pineapple
Stewed pears
Stewed prunes

Vegetables.
Asparagus
Beans, fresh
Beets
Cabbage
Carrots
Cauliflower
Celery
Cucumbers
Eggplant
Greens
Kale
Lettuce
Radishes
Rhubarb
Spinach
Tomatoes
Watercress

Grains.
Bread
Bran bread
Bran muffins

Soups.
Beef broth
Bouillon
Celery soup
Chicken broth
Fruit soup
Mock turtle
Mutton broth
Ox-tail
Vegetable soups

Beverages.
Eggnog
Mineral waters

Miscellaneous.
Brazil nuts

Desserts.
Gelatin

Game.
Rabbit
Venison

Poultry.
Chicken
Duck
Squab
Turkey
Goose

ed—*Continued.*

n

s
ped beef
ed beef

Meats.

Kidneys
Lamb, Mutton
Liver
Mutton
Pigs' feet
Pork
Sweetbreads
Tongue
Tripe
Veal

Fruits.

es
nas
s
seberries
pes
ons
nges
ns
sins
gerines

Beverages.

Chocolate
Cocoa
Coffee and Tea
Fruit juices
Malted milk

Miscellaneous.

Almonds
Chestnuts
Cocoanut
Filberts
Peanuts
Peanut butter
Pecans
Sugar and Syrups

Breads.

Biscuits
Corn bread
Crackers
Gluten bread
Raisin bread
Rye bread
Zwieback

Grains.

ley
nmeal
cked Wheat
ina
niny
caroni
ize
odles
meal
e
led Oats
ghetti
micelli

Appetizers.

Pickles

Vegetables.

Beans, dried
Corn
Peas
Potatoes, white and sweet
Pumpkin

Soups.

Cream soups
Noodle soup
Pea soup
Rice soup
Thick soups

Desserts.

Cake
Candy
Ices
Jams
Jellies
Pastries
Preserves
Puddings
Sago
Tapioca

LLOWED ONCE WEEKLY.

Fruits.

rants
kleberries

Soups.

ley soup
n soup
wders
n soup

ALLOWED TWICE WEEKLY.

Vegetables.

Brussels sprouts
Mushrooms
Onions
Parsnips
Squash
String beans, fresh
Turnips

Allowed once weekly. (*Continued*)

Vegetables.

Artichokes

Miscellaneous.

Hickory nuts
Walnuts

Desserts.

Ice-cream

Allowed twice weekly (*Continued*)

Appetizers.

Olives

Fruits.

Apricots	Muskmelon
Blackberries	Peaches
Blueberries	Pears
Cherries	Raspberries
Cranberries	Strawberries

Cane sugar should be sprinkled in generous quantities on cher grapefruit, etc., and a tablespoonful of milk sugar should be ad to every large glass of milk.

Suggestions.—Despite the enormous amount of research which been done in the study of the causes and in the treatment of epile no specific treatment of this condition has been determined. H ever, many patients have been greatly aided by the two diets s gested. All violent exercises and too fatiguing physical work sho be avoided. An afternoon rest period, especially with children often helpful. Patients who are constipated should use alkal laxatives. Sodium bicarbonate, gr. v, is prescribed twice daily specially enteric-coated tablets so the alkali may reach the sm intestine. Especially in the first weeks of the treatment, colo irrigations may be used (1 tablespoonful of sodium bicarbonate 1 gallon of warm water) until the return flow is clear. This is giv after a simple soap water enema. Little if any sedative medicati should be used except in a "status epilepticus," and then it shou be given by the intravenous route.

ERYTHEMA.

Refer to page 294.

EXANTHEMATA

VINCENT LARKIN, M.D.

Infants and children are susceptible to a large variety of acu infections. The younger the child, the lower is his resistance to t many diseases with which he is brought in contact. It is not unusu for children under the age of three years to contact acute respirato infections, such as tonsillitis, common colds, and ear infections often as every three or four weeks. This frequency, however, do not interfere with the state of nutrition of most children for th are capable of regaining rapidly the weight that they have lost wh ill. Another important consideration is the anorexia which fair regularly accompanies most acute infections. This problem maintaining an adequate caloric intake arises only in the course long drawn out and chronic illnesses. Indeed, an attempt to ma a child take a normal or high caloric diet in the presence of infectio such as tonsillitis, otitis media, pyelitis, and pneumonia, usua

s in complete refusal or vomiting. It is probably more impor-n young than older infants that the caloric intake be disre-d when they are ill. The digestive capacity of the small ts is hardly more than enough to take care of his digestive needs r conditions of health and the digestive capacity is usually edly decreased in the presence of infection. Ingestion of a full ic diet in such a case almost inevitably leads to vomiting, diar-or both. For practical purposes, we may disregard the caloric e of children in the early stage of their illness.

ainterance of fluid balance, however, is of the utmost impor-in acutely ill children and can be readily achieved. The body e infant and child is hydrolabile and dehydration may be rapidly uced in the presence of fever, vomiting or diarrhea. The ful effects of severe dehydration are presented elsewhere.

tosis also develops rapidly in acutely ill children because of mall reserves of liver glycogen in children. This may be over-in part by the administration of sweetened fruit juices to sick dren, thereby combatting dehydration and supplying additional min C at the same time.

he general principles of dietary management of acute illness hildren, then, are:

Initial prevention of dehydration and ketosis by a liquid diet, including water, fruit juices, milk (diluted with an equal quantity of water), weak tea, clear broth, and in older children carbonated beverages, as ginger ale, flavored "soda", cola drinks, etc. The child who demands his regular diet may be given small quantities of his regular food.

. Soft, easily eaten and digested foods may be given after the first one to three days of illness, as the patient begins to improve, as custards, jello or gelatine, ice cream, junket, toast and cookies.

The regular diet may be offered ordinarily when the patient is allowed out of bed in the case of older children, when permitted out of doors in the case of infants.

Iodifications of these rules may be needed to meet special umstances that arise in different diseases of children. These indicated under the specific illnesses discussed.

carlet Fever.—Scarlet fever is an acute, infectious disease ally involving the naso-pharynx and caused by the hemolytic ptococcus. The infection involves the membranes of the naso-rynx but occasionally the organism may be disseminated by of the blood. From the site of infection various toxins are orated by the strepococcus and absorbed into the blood. The ase is variable in its severity. It occurs most frequently in young dren, with the highest seasonal incidence between September June.

he onset of symptoms is abrupt, with fever, sore throat, head-, and vomiting. The generalized rash appears within one to e days after the onset of symptoms. Examination reveals a

diffusely inflamed pharnyx often with petechiae on the soft p
The rash is diffuse, erythematous and finely papular.

Complications may be early, such as otitis media and ce
adenitis, sinusitis and acute myocarditis; or late complication
as glomerulonephritis, arthritis and perhaps rheumatic fever.

Diet.—At the onset and for the first two or three days whe
patient is acutely ill and complaining of considerable pain i
throat, a fluid diet should be maintained. Cool liquids are gen
taken better than are warm liquids and it is advisable to p
only sips, since the ingestion of a large quantity at one time is
followed by vomiting. Water, fruit juices and milk are taken
in the early stages. Sucking cracked ice may relieve some o
pain in the throat. The occasional patient who prefers warm l
may be offered weak tea and clear broth. If there is a desir
food, small quantities of soft foods, such as ice cream, custard
jello may be given. The patient who requests his regular diet us
refuses it when it is placed in front of him. A gradual return
regular diet is in order as the patient convalesces.

Pertussis.—Pertussis is an acute infectious disease involving
respiratory tract and caused by H pertussis. The disease oc
epidemically at intervals of two to four years, and is more freq
in densely populated areas. It is more common in young chil
and occurs throughout the year.

Cough is the most prominent symptom and gradually incre
in severity over a period of about ten days to two weeks. It is m
severe at night. The cough gradually becomes paroxysmal in t
with repeated coughing spells in which the patient is unable
catch his breath between coughs, becomes red in the face,
finally expells or swallows a plug of thick tenacious mucus.
infrequently the patient vomits as he expells the mucus and t
catches his breath in a typical crowing inspiration known a
"whoop". The cough may be precipitated be emotional distu
ances, sudden exposure to cold, tobacco smoke, or physical activ
The duration of the disease is variable, lasting from a few week
several months. Complications are otitis media, bronchopneumo
bronchiectasis, nervous system involvement and malnutrition.

Diet.—Because of the persistent vomiting it is necessary to o
the child frequent small feedings. The patient should be fed
often as every one or two hours if vomiting is severe and only sm
quantities of food should be given. Nutrition may be maintai
if high caloric fluids such as egg nog, sweetened fruit juices, mal
milk, are given in addition to soft foods which are easily tak
such as custards, ice cream, jello, junket, and pudding.

Measles.—Measles is an acute infectious disease of childh
caused by a virus. The disease occurs most frequently in child
and is more frequent in thickly populated areas. Epidemics oc
about every second year.

The symptoms at onset are fever, slight cough, coryza, a
conjunctivitis. The fever may subside after a day or two tho
the cough increases in intensity. Koplik's spots appear in

l mucous membrane about the third day and fever recurs 'the fourth or fifth day with the appearance of the rash. The egins on the face and gradually spreads downward over the Although the patient may be acutely ill for two or three days the appearance of the rash there is a rapid abatement of all oms and signs when the rash becomes full blown. Complica- are otitis media, bronchopneumonia, and encephalitis.

t.—The diet maintained is similar to that of other acute es of children. Fluid intake is most important at the onset here is gradual change to soft foods as the patient begins to ve. Return to a full diet is delayed until the patient shows of a return of appetite.

icella.—Varicella is an acute contagious disease probably d by a virus. The disease occurs most frequently in children ccurs in epidemic of two to four year intervals. The disease is ally a mild one. Symptoms at the onset are slight fever and se followed in a few hours by the appearance of the typical first macules and then vesicles. Lesions appear on the body st and spread outward in all directions.

et.—The dietary management in varicella does not differ from used in other contagious diseases.

umps.—Mumps is an acute contagious disease caused by a . It occurs most frequently in children. It is a systemic se with most obvious manifestations in the parotid glands. mptoms are vague at the onset with fever and malaise, followed in twenty-four hours by the enlargement of one or both parotid ls. Fever generally lasts for two to three days but the parotids in enlarged for periods varying from seven to fourteen days. e may be considerable pain on chewing or swallowing. Com- tions are much less common in children than in adults and de orchitis, pancreatitis, and meningo-encephalitis.

et.—It is impossible to predict what an individual child will e or be able to eat, but solid foods are generally not taken well e onset because of the pain that occurs with chewing. Sweeten- quids and soft foods cause less distress than those with a sharp acid taste. In other respects, management of the diet parallels of other contagious diseases.

INFANTILE ECZEMA

Vincent Larkin, M.D.

fantile eczema is an allergic state manifested by moderate to re lesions of the skin accompanied by itching. The condition robably due to food allergy but it may be complicated by tion as well as mechanical irritation of the skin by contact silk, wool, rough clothing, ammoniacal diaper, seborrhea, local ications, and the constant rubbing and scratching that results itching. Other predisposing factors are thought to be the water and sodium chloride content of the infant's skin which increase its irritability. A deficiency of unsaturated fatty acids een found in patients with infantile eczema by Hansen and his

co-workers. Over-feeding, particularly of fats, may also be a since most infants with eczema are well-nourished. However, malnutrition often accompanies the worst case of eczema.

In the young infant, a milk allergy is most frequently the ca the eczema. Older infants who have been given a more varie are often sensitive to egg and wheat as well as to milk. allergies may not be detectable by ordinary means of skin te because of the great irritability of the infant's skin. Passive tra tests may also fail to show this allergy because of the inabil the infant to produce antibodies in any quantity.

Skin lesions in infants characteristically appear on the ch forehead, chin, scalp, occasionally behind the ears, on the anteriorly and in the antecubital and popliteal spaces. At t an eruption is present in the diaper area, particularly if there ammoniacal diaper in combination with the food allergy. In children the lesions are usually limited to the antecubital and liteal spaces, dorsum of the hands, and occasionally about mouth. Itching is invariably present and may be mild or se

The course of the disease is protracted, with remissions exacerbations. In most instances the condition will spontaneo disappear between the second and third years. A few cases continue to have difficulty until they near puberty.

Diet.—Mild cases of eczema in the *breast fed* infant should treated by application of lotions or ointments to the affected s The infant should not be weaned. If there is no improvement local skin treatment alone, it is advisable to remove comm allergens such as egg and wheat, one at a time, from the moth diet.

Mild cases of eczema in *artificially fed infants* should be trea by modifications of the milk protein as well as by local skin appl cations. In some instances, heating the milk in a double boiler two to three hours may change the protein of the milk sufficie to remove the offending allergen. If there is no improvement this regime then a hypo-allergic milk such as S.M.A. hypo-alle milk either whole liquid milk or whole milk powder should be u The whole liquid milk is used in formulas in the same proporti as cow's milk would be used. The hypo-allergic milk powder r be reconstituted by the addition of 4 level tablespoonfuls to 8 ou of water. If these preparations are used in an infant's formul may be necessary to increase caloric value of the formula by addition of Alerdex (S.M.A.) which is a protein-free combinat of maltose and dextrins, containing 110 calories per ounce (4 l tablespoonfuls per ounce). Substitutions of goat's milk, eit whole or evaporated (Meyenberg) is beneficial in an occasi patient. We have had a greater degree of success in the Pedia Eczema Clinic of the New York Post-Graduate Hospital, in the of soy bean preparations, which are valuable as complete substitu for milk. Several preparations are available:—Mull-soy (Borden Company), Sobee (Mead-Johnson), Allerteen (Ameri Dietaids Company). In addition, Soyola, (Weyth) an emulsio soy bean oil which is rich in linoelic acid, an essential unsatura

acid, may be used to supplement the diet in a dosage of 1 to 2 onfuls 3 times a day. It is usually added to the milk and be continued for several months. Another hypo-allergic ation which may be used with success when soy bean prep- ns are not taken well in Nutramigen (Mead-Johnson), a ration of amino acids which has been fortified with milk fat, -maltose and minerals. It has been of distinct value in some of severe eczema which have not responded to any previous y restriction. New foods such as cereals, vegetables, fruits, ggs should be added to the diet at the customary time but considerable caution. Each new food should be given at first ery small quantity for a period of at least one week and no new food should be given at the same time. The quantity of articular food may be increased gradually if there is no exacer- n of the eczema. Orange juice and fish liver oils should be ntinued since they are occasionally capable of making the na worse. Ascorbic acid and vitamin D in an aqueous base d be substituted.

oderate and severe cases of eczema in infants almost invariably re a complete removal of milk and replacement with a milk itute. Mull-soy is a liquid, similar to evaporated milk, and ld be diluted with water in a ratio of $\frac{1}{3}$ Mull-soy to $\frac{2}{3}$ water in ts under five months of age, and should be diluted with an l amount of water in infants over five months of age. Sobee Allerteen are dispensed in powder form. Sobee is to be recon- ted in a standard dilution of 6 level tablespoonfuls to 7 ounces ater; Allerteen in a standard dilution of 5 level tablespoonfuls ounces of water. Nutramigen is dispensed as a powder and be reconstituted to a standard dilution by addition of 1 level espoonful of Nutramigen to $1\frac{3}{4}$ ounces of water. The contents his preparation in the original state and in the diluted state be found in the following table.

ull-soy may also be used in place of milk in the preparation of erous other foods such as puddings, custards, ice cream, mashed toes, and corn bread. Some recipes which have been prepared manufacturers (Borden Co.) are as follows:

Mull-Soy Ice Cream

cup Mull-soy	1 tablespoon water
tablespoons sugar	1 teaspoon vanilla

1 teaspoon unflavored gelatin

hill Mull-soy. Add sugar and whip briskly, until well blended. often gelatin in water for a few minutes. Dissolve over hot water. dd to Mull-Soy and sugar, blending well. Add vanilla and end. Place in freezing tray and freeze in automatic refrigerator ntil mixture reaches mushy stage. Remove from freezing unit nd beat until smooth, but not melted. Replace in freezing unit, irring several times before completely frozen. Serves 3.

rushed fruits (fresh, canned, or frozen), fruit syrups, or other avoring agents such as maple, caramel, molasses, coffee, etc., ay be added to the above recipe.

TABLE 32.—MILK SUBSTITUTES

Proprietary Name	Percentage Composition: Undiluted Fat	Undiluted Prot.	Undiluted Carb.	Standard Dilution Fat	Standard Dilution Prot.	Standard Dilution Carb.	Cal. per Oz.	Cal. per Tblsp.	Tblsp. per Oz.	Standard Dilution	Diluted Cal. per Oz.	Ash Undiluted	Ash Diluted
Hypo-Allergic Whole Milk (S. M. A.)				3.5	3.3	4.7				Undiluted	19.5	0.7	
Hypo-Allergic Whole Milk Powder (S.M.A.)	27	26.0	39.0	3.5	3.3	4.7	142	37	4	T2–W4oz.	19.5	6.0	0.7
Evaporated Goat Milk (Myenberg)	7.2	8.0	8.4	3.5	3.5	4.4	38			1oz.–W1oz.	19	1.6	0.8
Sobee (Mead-Johnson)	19.2	32.0	38.4	2.4	4.0	4.8	130	22	6	T6–W7oz.	16	8.0	1.0
Mull-Soy (Borden)	7.8	6.0	8.9	4.0	3.1	4.5	40				20	2.0	1.0
Allerteen (Am. Dietaids Co.)	30.8	23.1	38.6	4.2	3.2	5.0	165	35	5	T5–W7oz.	22	5.9	0.7
Nutramigen (Mead-Johnson)	18.0	15.0	55.0	2.4	2.0	7.3	132	38	32	T1–W1–4	18	5.0	0.7

Rice Pudding

p Mull-Soy	2 tablespoons sugar
p boiling water	$\frac{1}{4}$ teaspoon salt
blespoons uncooked	$\frac{1}{8}$ teaspoon nutmeg
hite rice, washed	$\frac{1}{4}$ cup raisins

nbine Mull-Soy and boiling water in top of double boiler. dually add rice, stirring constantly. Add sugar, salt, nutmeg raisins; mix well. Cover and cook over boiling water one and quarter hours or until rice is tender, stirring occasionally. kes 4 servings.

Mull-Soy Custard

ggs	$\frac{1}{4}$ teaspoon vanilla
ablespoons sugar	$\frac{3}{4}$ cup Mull-Soy
easpoon salt	$\frac{3}{4}$ cup boiling water
	Nutmeg

at eggs slightly. Add sugar, salt, and vanilla. Gradually add ull-Soy which has been mixed with boiling water, stirring nstantly. Strain into 4 custard cups. Sprinkle with nutmeg. ace in pan containing warm water to level of custard in cups. This helps prevent curdling.) Bake in moderate oven (375° F.) out forty minutes or until knifeblade inserted comes out clean, dicating custard is done. Makes 4 servings.

Mashed Potatoes

ilute a small quantity of Mull-Soy with an equal quantity vater in which potatoes were boiled. Mash the potatoes, salt and the diluted Mull-Soy, beating until light and smooth.

Cornbread

(Contains no milk, egg, or wheat)

ps cornmeal	1 cup Mull-Soy
easpoons salt	$\frac{1}{3}$ cup shortening, melted
p water	3 teaspoons baking powder

cornmeal and salt. Gradually add water, stirring until oth. Add Mull-Soy and slightly cooled shortening, mixing l well blended. Stir in baking powder. Pour into greased ch square pan. Bake in hot oven (450° F.) twenty minutes. into squares; serve hot. Makes six 2-inch squares.

n addition to complete removal of milk, the moderate and severe s of eczema respond more satisfactorily when egg, wheat, fish, chocolate are removed from the diet. Foods permitted in diet are as follows:

everage: Pineapple juice or grape juice.

ruit: Pineapple, apple, apricots, plums.

ereal: Cornmeal, hominy, Post Toasties, Puffed Rice, cream of rice.

leat: Lamb, beef, mutton.

egetables: Corn for a child of 6 years or older (fresh or canned), asparagus (fresh or canned), lettuce, string beans, carrots.

Permitted—(*Continued*)

Bread: Rye.

Butter substitute: Salted Crisco.

Fat: Mazola oil.

Flour substitute: Cornstarch, rice flour, rye flour.

Miscellaneous: Karo, apricot jam, molasses, refined s brown sugar, salt, unflavored gelatin, hard candy—fla with peppermint, wintergreen, . . . no soft candy

1. No foods other than specified can be used. The gra the lamb may be thickened with cornstarch . . not fl
2. The foods permitted may be eaten in unlimited quant
3. Even a minute amount of food not included in the di eaten, may nullify an otherwise successful trial and co the solution.
4. Combinations and preparations of the foods included in diet may be devised by the patient.
5. To prevent constipation, a liberal use of fruits permitte advisable. In addition, water should be drunk in l quantities and brown sugar on the cereals may be hel

Suggestions.—All forms of irritation should be elimina such as rubber pants and rubber sheets, irritating powders soaps and improperly cleansed diapers. The itching and consequ scratching may be relieved in many cases by administratio anti-histamine drugs, such as Benadryl and Pyribenzamine. Lotio salves and other topical medications must be prescribed to suit needs of the individual patient. Mechanical restrictions to the a are needed at times. Chemotherapy and anti-biotics are to used freely in the presence of respiratory infection, skin infectio and other similar complications.

FEBRILE CONDITIONS.

Discussion.—The dietetic management of the febrile patient sharply divided into diets for fevers of short and prolonged durati

Until the past quarter of a century, the generally accep diet therapy for a patient suffering from a disease characteri by fever, was one of partial or complete starvation. Coincident w the work of Coleman and Shaffer in 1907, this stereotyped attit was revised, and therafter certain fevers have been well fed wh none has been subjected to purposeful undernourishment.

A good understanding of the body requirements in febrile con tions can best be obtained by reference to Typhoid Fever.

The diet for fevers of long duration is a modified typhoid diet indicated. In feeding a fever of short duration, a day or two subminimal feeding is often instituted. Joslin deplores the tender to overfeed patients convalescing from acute toxemias and infectio believing that in so doing a strain is put upon the pancreatic functi and so predisposes to diabetes.

A well confirmed and common sense dietary regimen to be ins tuted in fever has been presented by Gauss. The principles of t diet consist in the division into three stages. First stage: Compa

intestinal rest. Second stage: The prescription of easily ed foods with an indicated caloric value. Third stage: Restor- of a balanced diet.

First Stage.

8 A.M.	Fruit juice
0 A.M.	Coffee *or* tea with milk and sugar
2 NOON.	Gruel with milk and sugar
3 P.M.	Ice-cream, custard *or* junket
6 P.M.	Eggnog, buttermilk *or* milk
9 P.M.	Consommé, bouillon *or* broth

Second Stage.

8 A.M.	Fruit juice
	Gruel with cream and sugar
10 A.M.	Eggnog
12 NOON.	Broth
	Boiled rice with butter
	Simple pudding
3 P.M.	Buttermilk, malted milk *or* milk
6 P.M.	Cream soup
	Soft-cooked egg
	Ice-cream *or* custard
9 P.M.	Hot milk *or* cocoa

Third Stage.

8 A.M.	Fruit juice
	Cooked cereal with cream and sugar
	Egg, except fried
	Toast with butter
	Coffee with cream and sugar
Midmorning.	
	Milk *or* cocoa
12 NOON.	Cream soup
	Minced meat
	Puréed vegetable
	Bread with butter
	Simple pudding
	Tea with lemon
Midafternoon.	
	Buttermilk, malted milk *or* milk
6 P.M.	Baked *or* mashed potato *or* boiled rice
	Puréed vegetable
	Bread with butter
	Puréed fruit or simple pudding
Bedtime.	Hot milk *or* cocoa

OTE.—The caloric diet for the third stage is subject to much ation, depending essentially upon the volume of the foodstuffs

utilized. The average servings of the preceding dietary will
about 2500 Calories per diem.

Suggestions.—In the course of treating febrile conditions essential to take recognition of the patient's whims and fancie well as any possible presenting idiosyncrasies.

The preceding menus can be utilized in such condition *whooping cough, influenza, la grippe, acute bronchitis, the ex themata,* etc.

Particular note should be made that in the preceding menu of the foods are caloric-bearing with the possible exception of br

FERTILITY.

Refer to page 410.

FISSURE-IN-ANO.

Refer to page 503.

FLATULENCE.

JEROME MARKS, M. D.

Discussion.—Flatulence is one of the most common complai encountered in the practice of medicine. It is to be noticea observed in races fundamentally of high nervous excitability, amo people suffering from excess nervous strain and, additionally, aërophagics. The incidence of aërophagia is exceedingly sma and generally requires care by the neurologist.

It is recognized that flatulence is but a symptom and gen ally the etiology such as colitis, gall-bladder disease, etc., c readily be determined.. On the other hand, a large percentage cases present no determinable cause except one of a nervous natu

It has been determined that there is a series of foods which te to produce or exaggerate flatulence. The institution of a diet which these foods are omitted will, in the majority of cases, aid correcting the complained-of symptom. Failing the desired resu a thorough series of stool analyses will often yield enlightening info mation in respect to foods which are imperfectly digested. In t main, correction of glaringly faulty daily habits, as well as diete errors, will yield results. Refer to list of Flatulence Producing Foo

Omit.

Beans, especially dried beans
Broccoli
Brussels sprouts
Cabbage
Cantaloupe
Carbonated waters
Cauliflower
Cheese other than cottage or pot cheese
Chocolate
Nuts
Onions
Pastry and pie
Peppers
Pork
Preserved and pickled meats and fish
Radishes
Raisins
Raw fruits

—(Continued)

ndiments
rn
rned beef
icumbers
ame
arlic
reen and red peppers
rossly sweet foods
ntils
alt beverages
eat broths
Rich desserts
Salted foods
Sausages
Shellfish
Sparkling wines
Soda water
Soft drinks
Stews
Sweets
Swiss chard
Turnips

Typical Menu.

kfast:

ruit juice *or* stewed fruit
hole grained cereal, cooked or prepared, with cream and sugar
ggs, except fried
oast *or* rolls with butter
lilk *or* coffee with cream and sugar

cheon:

hoice: meat, fish, eggs *or* cheese
hoice of cooked vegetables: beets, carrots, spinach, squash, tomatoes, peas
mall salad with dressing
read with butter
tewed fruit
lilk or tea with lemon

nner:

ream soup
leat *or* fish
otato, baked or mashed
ooked vegetable, choose from luncheon list
read with butter
imple dessert
offee with cream and sugar

OTE.—Butter should be used sparingly in the preceding menu.

uggestions.—The author has had some success in dealing with es of marked flatulence by instituting a relative starvation with ning but liquid for a period of forty-eight to seventy-two hours, owed by the prescription of the foregoing dietary. On the other d, it has been often observed that the maintenance of dry meals been of marked benefit. In these cases the required amount of l is taken between meals and not over $\frac{3}{4}$ glass of liquid is allowed neal-time.

he presence of flatulence is very frequently traced to some vidual food or group of foods to which the patient has always

exhibited an idiosyncrasy. The determination of these foods their omission from the diet can frequently obviate the presen complaint.

In the study of the mechanics of digestion, it is readily observ that fats tend to delay gastric evacuation. This tardy actio commonly responsible for the complained-of foods repeating the associated gas for hours after their ingestion. Limitation fats in these cases will prove of benefit. Refer to Foods Highes Fat. In all cases of flatulence it is also warranted to investig thoroughly the biliary tract for a possible etiology.

GALL-BLADDER DISEASE.

J. Russell Twiss, M.D.

Discussion.—Disorders of the biliary tract are usually conced to be the most prevalent causes of indigestion. In the opinion leading investigators, dietary management is of the greatest imp tance in the relief of such disorders. There is no longer any jus fication for an attempt to apply a single type of diet to the ma widely divergent types of organic and non-organic disorders whi affect the gall-bladder. While dietary management may pro beneficial both in the relief of digestive symptoms and in the pr vention of complications, its effectiveness is entirely depende upon an understanding of the individual patient and the cause the symptoms. This understanding can be obtained only by careful investigation, the details of which should precede a discu sion of dietary factors.

In general, it is first necessary to stress the fact that the liver an extrahepatic biliary tract constitute an extremely complex mecha ism which is influenced by many hormonal, vascular, and other fa tors which seem to be directly or indirectly influenced by th autonomic nervous system. While the control of the rest of th digestive tract by the autonomic nervous system is universally co ceded, its relation to the biliary tract has heretofore been so poor understood that in most cases this fundamental factor has bee overlooked.

While it is not necessary to discuss the manifold functions of th liver, a brief review of extrahepatic physiology as outlined by Iv seems justified, primarily because of the ways in which abnormal ties in function may be influenced by dietary means. Bile is bein secreted continuously by the liver; during fasting, however, i entrance into the duodenum is largely prevented by the closur of the common duct sphincter. During fasting the bile is diverte into the gall-bladder, which not only concentrates the bile six t ten times, but serves as an equalizer of biliary tract pressure. I response to food, concentrated gall-bladder bile is discharged int the duodenum by the more or less simultaneous relaxation of th common duct sphincter and the contraction of the gall-bladde After digestion the common duct sphincter again closes and the gal bladder is refilled with bile. The factors which interfere with th orderly sequence of events and consequently produce sympton

in some cases pathologic conditions are stasis, infection, and bolic disorders. The mechanism of these will be discussed later.

agnostic Investigations.—A detailed history will frequently, in of functional disturbances, reveal environmental conditions ng a direct relationship to the onset of biliary tract symptoms. symptoms may be caused by financial worries, unsatisfactory ness conditions, or unhappy family situations. One must realize inability to correct conditions of this kind may completely fy the effects of any type of medical or surgical treatment.

he cholecystogram has provided indispensable diagnostic find- particularly since the oral administration of dye by the double- method has been developed by Stewart and Illick. Normal alization and normal emptying of the gall-bladder mean in most s a normal gall-bladder, occasionally however normal visual- on and emptying may occur with the diseased gall-bladder. patient having impairment in visualization of the gall-bladder howing a disturbance in filling or emptying of the gall-bladder, t be subjected to further investigation before arriving at a final nosis. While most patients having no visualization of the gall- lder have definite pathology, Lahey and Jordan have shown that nany cases, in which the gall bladder did not visualize initially, mal function may be restored by medical management.

iliary tract drainage has proved a valued supplementary method liagnosis. By this means the disturbances in gastric acidity ch are so common in patients with gall-bladder disease may be ermined; abnormal findings, however, should be confirmed by the ald test meal. Evidences of functional disorders may be ob- ned by the response of the gall-bladder to stimulation. The non- ctional gall-bladder is in most cases indicated by the absence of centrated gall-bladder bile. Microscopic examination further- re is of value in establishing the diagnosis of stones. Cultures oile taken under sterile precautions give reliable evidence of in- ion of biliary tract.

Vhile the diagnosis of stones can be made with considerable ac- acy, a diagnosis of biliary tract infection is usually presumptive. wever, bacteriologic studies of the duodenal bile obtained by ns of the encapsulated Twiss duodenal tube have given accurate lence of biliary tract infection, 74 of 75 cases having sterile pre- rative drainages proved to have all parts of the biliary tract ster- at operation. Of 28 patients showing positive cultures of signif- nt organisms pre-operatively, 25 showed identical types of organ- s at operation. These facts are of significance because most follow- studies of patients after cholecystectomy have shown satisfactory ılts only in those having actual infection, stones, or biliary tract truction.

'hemical blood studies have proved useful in dietary management ndicate the presence of hypercholesteremia, a metabolic disturb- e quite common in biliary tract disease. This may be associated hypothyroidism, arteriosclerosis, or other conditions outlined Muller. Elevation of the urea nitrogen or blood sugar may

furthermore give evidence of unsuspected kidney disease or betes. Various liver function tests have proved useful in the de tion and treatment of liver disease. Biliary tract obstruction liver pathology are sometimes indicated by an elevation of icterus index and serum bilirubin.

Finally, a few other conditions giving symptoms simula biliary tract disease should be mentioned. Mucous colitis or spa constipation may be associated with gall-bladder disease or in pendently give similar symptoms. Peptic ulcer, gastritis, or pyl spasm also may present symptoms which are difficult to different from those of gall-bladder disease. Chronic or acute appendi always remains a possible etiologic factor, the common associa of a diseased gall-bladder and a diseased appendix is well kno Renal pathology may give distention, pain, and other sympto suggestive of biliary tract disease; the most common conditions renal calculus, pyelonephritis, and stricture of the ureter. Coron disease and syphilis must also be kept in mind as possible causes abdominal pain.

Biliary Dyskinesia.—Actual organic disease of the gall-bladder previously described, should be differentiated from disorders of gall-bladder due to functional disturbances or dyskinesia, for description of which we are largely indebted to Westphal and I and Sandblom. The disorders are divided into atonic and hyp tonic types, *either one of which may be associated with actual infecti*

The **atonic** or flaccid type of gall-bladder is most common elderly people of sedentary habits, particularly those addicted overeating. Discomfort of the epigastrium or right upper quadra is common, as are symptoms of discomfort, gas, and constipatio The cholecystogram shows in these cases an enlarged balloon-shap shadow, with delayed or slight diminution in size following a fat meal. Biliary tract drainage usually shows a low gastric acidit a large amount of moderately concentrated bile following stimulati with olive oil, possibly crystalline sediment suggesting stas

The **hypertonic** type of gall-bladder enlargement occurs in t nervous tense type of individual having an imbalance of the aut nomic nervous system. This may be associated with gastric hyp acidity or with some source of reflex stimulation which cau spasm of the common duct sphincter. In the **hyperacidity** ty there is commonly colic, heartburn, and acid eructations, in additi to the indefinite indigestion previously described. The cholecyst gram in the absence of infection shows an enlarged shadow wi good visualization, most commonly with a delay in emptying. T biliary tract drainage shows a gastric hyperacidity with impair response to stimulation and at times crystalline elements of stas Bacteriologic cultures are usually sterile.

The establishment of the diagnosis of gastric hyperacidity is mo important in the initial diagnostic work-up, for it is in this group th patients coming to operation furnish many cases of unsatisfacto results, including the presence of the so-called post-cholecystecton

ome. Following the operation the pains of these patients are vated rather than relieved.

e **hypertonic reflex** type of gall-bladder enlargement is associated some type of excessive stimulation which probably affects priy the common duct sphincter. This may originate in the al nervous system, as the result of excessive worry, exhaustion, nfavorable environmental conditions. The reflex type is also l associated with other evidences of pathology in the abdominal y, such as a diseased appendix, pyelonephritis, renal calculus, ptic ulcer. The hypertonic type of enlarged gall-bladders are acterized otherwise by tenderness in the right upper quadrant, h is relieved following biliary tract drainage, and a good visualon of the gall-bladder on cholecystographic studies. There is atively normal biliary tract drainage except for difficulty in enal intubation and the delayed response to stimulation which times results from spasm of the duodenum and common duct ncter.

eatment.—The successful treatment of functional disorders is ndent upon a complete and accurate initial diagnostic prore, in which should be included a detailed history, physical exation, *X*-ray of the gall-bladder, biliary tract drainage, and such nical blood tests as are indicated. The differential diagnosis veen functional disorders and organic disease is not easy. In y cases functional disorders precede the organic disease, which rvenes by reason of stasis, obstruction, or infection. It is thereof paramount importance to be sure that the functional disorder not progressed to the point of organic disease, before making the nosis of biliary dyskinesia.

ssuming that organic disease has been ruled out, by the methods ined under the heading of chronic cholecystitis, we are in a posito discuss the management of biliary dyskinesia of the various s.

n the **atonic** gall bladder group we are dealing in most cases with traditional "fair, fat, and forty" individuals in whom overeating, sity, and sedentary habits are prevalent. Stasis of the gallder is first relieved by the "stimulating" type of gall-bladder , which utilizes the principle that the best cholagogue is food, icularly that high in cholesterol and fats. Intermediate feedings ilk are used wherever possible. Diet No. 4 is low in caloric value he obese; Diet No. 5 high in caloric value for those underweight. se diets of course cannot be used for the occasional patients unto tolerate fats, or for those having a hypercholesterolemia. se diets are furthermore contraindicated in the presence of cirsis of the liver, since it has been proved that fatty infiltration of liver and consequently cirrhosis may result from the use of a diet in cholesterol or fat. Medication which is beneficial in this up includes bile salts which are especially indicated for constion. Dilute hydrochloric acid is frequently beneficial with achlorria; olive oil may also aid in the emptying of the gall-bladder. ies are useful in building up muscle tone and improving the gen-

eral condition. General hygienic measures should be str including regular meals, adequate fluids between meals, good h habits, out-of-door exercise and deep breathing.

In the **hypertonic** gall bladder group, the treatment of th tient with the hypertonic hyperacidity type of dyskinesia is u most satisfactory because of the prompt relief of the pain, coli heartburn which characterize this condition. The diets use this group are bland with intermediate feedings. Diet No. 3A preliminary diet, mostly liquids and starches, while Diet No. 3B maintenance diet, to be used after the relief of acute sympt Antacids are necessary; among those found useful are aluminun droxide gel, magnesium trisilicate, calcined magnesia, bismuth carbonate and calcium carbonate. Sedatives and antispasmo are also needed; with acute pain after meals, these are best g before meals. Among the sedatives, phenobarbital holds a pro nent place. The antispasmodic group includes belladonna, atrop trasentine, syntropan, Bellergal and many others.

The treatment of the hypertonic reflex gall bladder patient similar to that outlined for the hyperacidity patients. In the re group however, the initial diagnostic work-up is directed tow finding, as far as possible, the source of the reflex stimulation wh is causing the digestive symptoms. If cerebral in origin, an exp nation of the causative situation may be of assistance. The set ment of marital difficulties, the change of a job, the relief fr financial worries or excessive responsibilities, taking a vacati any of these may have therapeutic value far beyond that of medici The therapeutic regimen should furthermore take into considerat unhygienic habits such as rapid eating, rushing after eating, hur worry, inadequate fluid intake, neglected constipation. If the ref source of irritation lies within the abdominal cavity, it may be c rected by the removal of a diseased appendix, renal calcul or by the successful treatment of a spastic irritable colon.

Metabolic Disorders.—The importance of metabolic disord is stressed by the fact that the previously-held concept that disea of the gall bladder was in most cases infectious in origin has be entirely destroyed by evidence from the physiological and bacte ological laboratories, as well as the investigations of surgeons a internists. These extensive studies have shown in only a sm proportion of the gall-bladders coming to operation the presence infection. It should be stressed, however, that only the presence bacterial infection can be established with methods now genera available; the status of virus infections of the biliary tract must further investigated.

An example of a metabolic disorder affecting the biliary tract is t solitary metabolic gall stone, found without any evidence of infecti either upon bacteriological or pathological studies. Biliary dysk esia may have played an important part in its formation, by induci biliary stasis. As shown by Sweet, cholesterol in bile is held colloidal suspension by the bile salts, a disproportion between th constituents may result in the precipitation of stones. High blo

erol has been shown by Twiss and Barnard to be associated high cholesterol of the bile; it is therefore apparent that any which tends to raise the cholesterol content of the blood is of recognition.

lesterol is the main, if not the sole constituent of most gall . The cholesterol of the body is of exogenous and endogenous the latter is derived from the destruction of tissues of the The exogenous cholesterol is derived from food; the foods t in cholesterol are eggs and inner organs such as liver, kidneys, and sweetbreads. Cholesterol of vegetable origin is not asted by the body. The chief causes of hypercholesterolemia rvation, pregnancy, missed meals, hypothyroidism, and the ion of a diet high in cholesterol and fats. Conditions of biliary are present to a maximum extent during the later months of ancy; at this time the blood cholesterol is at its height. It is probable that a large proportion of gall stones are formed at me, a fact substantiated by statistical studies which show that n outnumber the men coming to operation for gall bladder e by as much as 20 to 1.

treatment of metabolic disorders of the biliary tract is dependon recognition of such conditions as hypercholesterolemia and y. With the former condition a low cholesterol diet, such as or No. 2, is indicated. In this way the blood cholesterol can ny cases be reduced, probably with less likelihood of stone tion, fatty infiltration of the liver, and cirrhosis. The low chool and low fat diet is also indicated in any case of active infecf the gall-bladder, for the stimulation of the gall-bladder at this is painful and productive of symptoms. Likewise the obstructsions of the cystic duct and the common duct are indications for se of these diets, for they protect the obstructive gall-bladder excessive contraction which results primarily from the foods n fats and cholesterol. It is furthermore a well known fact that atient with jaundice does better on the low fat diet. Inasmuch nmon duct obstruction is also associated with a hypercholestera, this also affords a good reason for the use of these diets.

ORGANIC DISEASE OF THE BILIARY TRACT.

scussion.—For reasons previously stated, it is impossible to diftiate accurately organic disease from functional disorders and bolic disorders; any one or any combination of these conditions be found in any given patient. A complete diagnostic investon, however, serves to indicate the facts in the individual case, ubsequent treatment then becomes self evident.

ronic Cholecystitis.—Chronic non-calculus cholecystitis is cterized by the presence of actual infection of the biliary tract, nfection may be active or quiescent. The presence of a virus tion cannot be demonstrated by readily available means at the nt time. The presence of bacterial infection can be determined a high degree of accuracy, however, by careful non-surgical age of the biliary tract, collecting specimens of bile under ster-

ile precautions. As a matter of fact, this furnishes the only positive evidence of biliary tract infection. X-ray examination only give confirmatory evidence by faint visualization or no visualization of the gall-bladder, both of which can be found w actual infection of the biliary tract.

The symptoms of chronic cholecystitis are pain, usually pro ed, dull, aching, constant, or intermittent. Colic most commonl curs with stones. The pain is apt to be aggravated by food, in ance to fats and eggs and fried foods is common. Low grade and tenderness in the right upper quadrant are prevalent. Dis fort after meals and being "afraid to eat" are characteristic. W ness, malaise, and anemia are more common when the disease progressed to the bile ducts and liver. X-rays reveal a faint vi ization of the gall-bladder, or no visualization if there is cystic occlusion. Biliary tract drainage may show no contracted gall-b der bile; cultures of bile are usually reported positive for colon b lus or streptococcus. Blood chemistry may give evidence of com duct obstruction or liver damage.

Once the diagnosis of infectious cholecystitis is established, gery is indicated at the earliest possible time. Temporizing these patients, using dietary treatment and medicine and dr ages, is never justified, even if there is temporary relief of sympt All experience has shown that there is no such thing as an effec biliary antiseptic, even the sulfonamides, streptomicin and penic have proved ineffective in practically all cases. Progressive dis is inevitable without early surgery; the infection of the gall-bladd followed in the course of time by involvement of the bile ducts, p creas, and liver. With this there is increasing morbidity, disabil and a higher operative mortality. In those patients coming to op ation, proper pre-operative preparation is essential.

Where operation is contraindicated or refused, medical therap sometimes a necessity. In this case the low cholesterol and low diets are used, either No. 1 or No. 2. Bile salts may be of some ass ance in cases of catarrh of the bile ducts; however, they have no eff in promoting the emptying of the gall-bladder. General hygie measures and vitamins are indicated. The removal of foci of inf tion is beneficial.

Acute Cholecystitis.—With few exceptions, this condition is acute exacerbation of a chronic infection, usually with stones. C trary to previous theory, there is in the majority of cases no evide of acute bacterial infection of the gall-bladder at operation, or bacteriological and pathological examinations. The history is lo standing and that of a chronic cholecystitis, sometime with recurr colic, chills, fever, and anemia. Physical findings of tenderness a rigidity of the right upper quadrant are present. Care must be tak to differentiate pancreatitis, coronary disease, and perforation of gastrointestinal tract.

Acute cholecystitis is a surgical condition; operation is indica as soon as the patient is properly prepared. The use of intraven fluids is essential, 5 per cent glucose and protein hydrolysate

d. The parenteral use of vitamin B complex, ascorbic acid, and in K are desirable in most cases. For those not having nausea omiting, a high protein diet (No. 6) is indicated. Chemical studies should be done before operation to insure adequate liv- ction. The lack of observance of the principles outlined has l to result in a much higher mortality rate.

olelithiasis.—Stones may form as a result of stasis and holic disturbances, or they may occur with infection and ob- tion. While some gall stones are "silent", the majority are as- ted with the symptoms of gall bladder disease, the severity of h depends upon the location of the stones and the degree of any iated obstruction or infection. Associated symptoms of ob- tion or infection include nausea, vomiting, jaundice, dark urine ight colored stools. Between acute attacks there is persistent estion, with discomfort and tenderness of the right upper quad- in most cases.

e diagnosis of cholelithiasis is most commonly made by radio- al examination. Stones in the gall-bladder frequently result in visualization of the gall-bladder, otherwise cholesterol stones negative shadows and calcified stones positive shadows. Bil- tract drainage may give microscopic evidence of stones on the nination of the biliary sediment, or positive cultures of bile taken r sterile precautions. Chemical blood examinations give evi- e of common duct obstruction, if present, by the presence of dice and elevation of the blood cholesterol and the alkaline phos- ase.

he treatment of cholelithiasis, like that of the infectious cholecys- and cholangitis with which it is frequently associated, is sur- l. The prompt relief of common duct obstruction is essential, for purpose of preventing permanent liver damage. Where the con- n is not acute, a prolonged period of building the patient up with et high in proteins and carbohydrates is necessary. Vitamin lements are needed. Before operation intravenous glucose and rolysates are beneficial.

alignancies.—Malignancies of the biliary tract are by no means . They are unfortunately seldom diagnosed until so far pro- sed that relief by any means is impossible; they are usually an lental finding at operation. The most common locations are in bile ducts, the head of the pancreas and the gall bladder. The lly-associated stones of the biliary tract constitute another ment in favor of operation once the diagnosis of cholelithiasis is blished. The symptoms of malignancy are those described for nic cholecystitis and cholelithiasis; in addition, however, there certain significant symptoms and findings. Progressive and istent pain is suggestive, especially if associated with loss of ht and strength, anemia, and anorexia.

undice, chills and fever may occur as the result of infection and ruction. Physical examination reveals emaciation, cachexia and r in most cases, with at times presence of hard irregular masses e right upper quadrant of liver.

X-ray examinations in patients with malignancies may sh presence of stones, or no visualization of the gall-bladder ary tract drainage may show no concentrated gall-bladde the presence of blood in the biliary sediment, or positive cu In the presence of jaundice the complete obstruction of the co duct which occurs only with malignancies is indicated by the l bile on biliary tract drainage, provided the location of the tu the duodenum is confirmed by fluoroscopic examination.

The treatment of malignancies of the biliary tract is of c surgical. Although in most cases with metastases nothing ca accomplished, nevertheless operation is indicated as it may great palliative value in the relief of such distressing sympto jaundice, nausea, vomiting and pruritis. Even though these s toms may not be present at the time of operation, they might occur later as the result of progressive obstruction which ma prevented by a short-circuiting operation. Diet No. 6 is indic before surgery, with such supportive measures as are indicat

REFERENCES

Bockus, H. L. Gastro-enterology, Vol. III. Philadelphia, W. B. Sau Co., 1946.

Carter, R. F., Green, C. H. and Twiss, J. R. Diagnosis and Manage of Diseases of the Biliary Tract. Philadelphia, Lea & Febiger, 1939.

Cecil, R. Textbook of Medicine. Philadelphia, W. B. Saunders Co.,

Graham, E. A., Cole, W. H., Copher, G. H. and Moore, S. Dise the Gall Bladder and Bile Ducts. Philadelphia, Lea & Febiger, 1928.

Ivy, A. C. Applied Physiology of Bile Secretion and Bile Salt Ther JAMA **117**:1151, Oct. 4, 1941.

Lyon, B. B. V. Diagnosis and Treatment of Diseases of the Gall Bla and Biliary Ducts. JAMA **73**:980, Sept. 29, 1919.

Twiss, J. R. and Greene, C. H. Dietary and Medical Managemen Diseases of the Gall Bladder. JAMA **101**:1841–7, Dec. 9, 1933.

Twiss, J. R. and Phillips, C. H. Bacteriological Findings in Disease o Biliary Tract: An Improved Method of Taking Sterile Cultures of Duod Bile. Am. J. of Digest. Disease & Nutrition **2**:663-67, January 1936.

Twiss, J. R. and Barnard, J. H. Disease of Biliary Tract Associated Disturbances in Cholesterol Metabolism. JAMA **111**:990-94, Sept. 10, 1

Twiss, J. R. Medical Management of Disorders of the Biliary Tract. N. Y. Acad. Med. **44**:617, June 1940.

Walters, W. and Snell, A. M. Diseases of the Gall Bladder and Bile D Philadelphia, W. B. Saunders Co., 1940.

DIFFERENTIAL DIETS IN BILIARY TRACT DISEASE.

Discussion.—To formulate a diet based upon the needs of patient, it is necessary to consider briefly the action of the vari types of food upon the biliary tract.

Carbohydrates are conceded to be the most easily digested typ food, the first to leave the stomach, least irritating to the duoden and the least stimulating to the gall-bladder and liver. Carbo drates are furthermore essential for building the glycogen rese and protecting the proteins of the liver, being particularly indica in cases of liver damage and before operation. Sugars are forced the limit of tolerance under these circumstances. A high carbo drate diet is used to provide weight, and to assist in fat metaboli

nt investigations have shown the value of protein in liver , where the protein metabolism of the liver cell is of vital ance in preserving its integrity and multiple functions. high in both proteins and carbohydrates is indicated in all of liver disease. If the patient is unable to tolerate food by , intravenous glucose and protein hydrolysates are given. le there are some patients with gastric hyperacidity who do lerate proteins well, an effort is made in all cases to provide at 0 to 100 grams of protein daily in the diet. The use of pro- ydrolysate by mouth in cases of peptic ulcer and gastric cidity has recently received considerable attention.

s are known to be the least digestible type of food, the most cause symptoms in patients having disorders of the liver or ladder. With a deficient amount of duodenal bile or pan- ferments the fats are poorly emulsified and absorbed. The of fats (especially those of egg-yolk, cream and olive oil) on ction of the gall-bladder is well known. It is therefore obvious ats should be limited in conditions in which there is obstruction common or cystic ducts, inflammation of the gall-bladder, ice; or liver damage.

the other hand, the patient having an atonic gall-bladder or ve chronic cholecystitis may well benefit by a liberal amount s in the diet, particularly cream and butter. It is the consensus nion at present that a moderate amount of fat is permissible in all-bladder diet unless the patient is unable to tolerate the fat re is a definite contraindication to its use. Fats and foods high olesterol are far more effective cholagogues than commercial rations of bile salts.

ods containing large amounts of cholesterol are contraindicated tients with hypercholesterolemia, cholelithiasis, active infection e gall-bladder, or cystic duct obstruction. The reason for this well-known power of the foods high in cholesterol, such as egg- to cause contraction of the gall-bladder. Limitation of the enous cholesterol supply has been found in several hundred nts to have a favorable effect upon hypercholesterolemia and mount of cholesterol excreted in the bile. A list of the foods st in cholesterol is to be found elsewhere (page 173). Rehfuss ound the number of cholesterol stones in the gall-badder to creased following an increase in blood cholesterol. The use of -cholesterol diet gives relief from pain and colic in conditions struction or inflammation of the gall-bladder. It has been ermore shown by Page that the ingestion of fats results in creased absorption of cholesterol, therefore in the low-cho- l diets fats are also reduced. Plant sterols or phytosterols llowed in the low-cholesterol diets because it has been demon- d that these are not absorbed (Schoenheimer).

ally, attention should be directed to the fact that diets high in cholesterol have been shown experimentally to tend toward infiltration of the liver, especially if the diet is low in lipotropic ances.

The possibility must not be forgotten of producing vitamin
D deficiencies with the low-cholesterol and low-fat diets, in
there is elimination of fats, cream, eggs, and inner organs su
liver and kidneys. Common symptoms of vitamin A deficien
clude malnutrition, sterility, impaired vision, a susceptibili
infections and nervous disorders. The addition of vitamins A a
preferably in concentrated form, is indicated with the low-chole
diets.

The indications for the use of the differential diets are best
nished by a complete initial diagnostic work-up, which should in
whenever possible in addition to the cholecystogram a gall bla
drainage, a determination of the gastric acidity, an icterus
determination, and a blood cholesterol. On the basis of these
ings, patients are classified and have prescribed for them one o
three groups of diets which follow.

In the first group are the low-cholesterol and low-fat diets
patients with hypercholesterolemia, cholelithiasis, fat intolera
cystic duct obstruction, a non-functioning gall-bladder (as shown
lack of visualization in the Roentgen-ray and no concentrated
being obtained on biliary tract drainage), or active biliary t
infection. These diets are also used following cholecystecto
This group includes Diet No. 1 for patients who are overwei
Diet No. 2, differing only in being high-caloric, is for patients w
recent loss of weight or those suffering from malnutrition.

The second group of diets, Nos. 3A and 3B, are modified Si
diets with interval feedings. These are used for patients wit
hypertonic gall-bladder, characterized by colic, associated with re
disturbances or gastric hyperacidity. Diet No. 3A is used at
beginning of treatment, or in patients with an associated pe
ulcer or duodenitis. Diet No. 3B is more of a maintenance d
to which meat has been added.

The third group of diets, Nos. 4 and 5, are relatively high in
and cholesterol. These diets will stimulate emptying of the g
bladder, and are for the purpose of relieving stasis and obviat
as far as possible the consequent likelihood of stone formation a
infection. The indications for these diets are a functioning g
bladder of the enlarged hypotonic or atonic type, which sh
delayed or only partial evacuation in the cholecystogram, with
response to magnesium sulfate stimulation on biliary tract draina
The contraindications to the use of these diets are hypercholest
emia, cholelithiasis, a non-functioning gall-bladder or active inf
tion of the gall-bladder. Diet No. 4 is low-caloric for obese patien
Diet No. 5 is high in caloric value, for those who are underweigh

Diet No. 6 is used in cases of liver damage, of toxic or infecti
origin, cirrhosis of the liver, or for jaundice associated with chro
cholecystitis or cholelithiasis. This diet is also used for obstruct
jaundice due to pancreatitis, malignancy, or stone. In gener
liver damage demands the use of a high-caloric, high protein a
high-carbohydrate diet with interval feedings; in acute conditions
this is added all the sugar the patient can tolerate. Fat is eliminat
as far as practicable.

Indications for Use of the Gall-bladder Diets.

Low-lipid Diets.

Diet No. 1.

aracteristics: Low cholesterol and fat, low caloric
dications: Fat intolerance, cystic duct obstruction
Active Infection of the gall-bladder or ducts
Hypercholesterolemia, cholelithiasis
Obesity

Diet No. 2.

haracteristics: Low cholesterol and fat, high caloric
idications: As for Diet No. 1, except for
Malnutrition, loss of weight

Antacid Diets.

Diet No. 3A.

haracteristics: Bland antacid
ndications: Initial treatment in
Gastric hyperacidity, pylorospasm
Duodenitis
Functional disturbances of the biliary tract with colic

Diet No. 3B.

haracteristics: As for Diet No. 3A
A maintenance diet for moderately severe cases, or to follow Diet No. 3A after improvement in symptoms

High-lipid Diets.

Diet No. 4.

haracteristics: Relatively high cholesterol, moderate fat, low caloric
Indications: Functionally impaired or atonic gall-bladder with biliary stasis
Obesity
Contraindications: Fat intolerance or cystic duct obstruction
Active infection of the biliary tract or liver damage
Hypercholesterolemia or cholelithiasis

Diet No. 5.

Characteristics: Relatively high cholesterol, moderate fat, high caloric
Indications: As in Diet No. 4, except for
Malnutrition, loss of weight

Diet No. 6.

Characteristics: High protein, high carbohydrate, moderate fat
Indications: Hepatitis, acute and chronic
Jaundice, all types except hemolytic
Cirrhosis of liver
Preoperative patients with severe dehydration or malnutrition

Foods Prohibited in All Diets.

Fried foods, fresh pork, shellfish, thickened gravies
All rich and highly seasoned foods
Condiments, spiced and pickled foods, salad dressings
Heavy cheeses, nuts, olives
Pies, pastries, chocolate
Alcohol and carbonated drinks
Roughage, as cabbage, cauliflower, corn, Brussels sprouts, cucumbers, bran

General Directions.

(Form for patient's use with the gall-bladder diets.)

Meals:

Foods should be taken in small amounts and at regula quent intervals, rather than in large amounts infrequ and irregularly. Food must be chewed carefully, must not be hurried.

Fluids:

The total fluid intake for twenty-four hours should be at 2 quarts (8 glasses). Water is to be taken freely b breakfast and between meals, sparingly with meals.

Relaxation:

An adequate amount of rest is essential for the relief of d tive symptoms. Nervous and physical exhaustion ma prevented by the avoidance of strenuous or unduly prolo physical or mental exertion, hurry, worry, or the assump of too many responsibilities. An hour's rest, preferably l down, should be taken whenever possible after the mid meal. If this is not practical, the rest should be taken be the evening meal.

Sleep:

At least eight or nine hours' unbroken sleep will aid sympt and improve the general health and resistance.

Aids in sleeping are (1) a hot drink at bedtime; (2) a warm b at bedtime for fifteen minutes; (3) the avoidance of (*a*) un fatigue; (*b*) excitement in the evening; (*c*) fluids after evening meal; (4) an enema if there has been no bowel mo ment during the day.

If these measures are not effective in promoting sleep, this f should be reported.

Elimination:

At least one bowel movement should be encouraged da preferably on rising or after breakfast.

Aids to elimination are:

(1) Measures which promote normal stool formation:
- (*a*) Adequate fluids between meals.
- (*b*) Adequate non-irritating bulk, as well-cooked ve tables or fruits, dark cereals, whole grain pr ucts.

(2) Unless otherwise prescribed, the avoidance of intesti irritants such as bran, skins, seeds, cabbage, partia cooked foods, raw fruits and raw vegetables.

Aids to elimination are:

(3) The avoidance of measures which cause colonic spasm
- (*a*) Constant hurry.
- (*b*) Worry.
- (*c*) Undue fatigue.
- (*d*) Loss of sleep.
- (*e*) Nervousness and irritability.

nation:—(Continued.)

(4) Increasing the intake of vitamin B, which is found in whole grain cereals, yeast, etc.

Persistent constipation not responding to the measures described should be reported for the purpose of obtaining further measures of relief.

ise:

An adequate amount of daily outdoor exercise is essential to good health. At least an hour of fresh air and sunshine is desirable daily. A brisk walk of 20 to 40 city blocks (1 to 2 miles), breathing deeply, will aid digestion and improve the general health. For the more vigorous, outdoor forms of recreation such as golf, tennis, and riding are frequently beneficial. Care must be taken, however, to avoid any exertion which causes shortness of breath, pain, discomfort or exhaustion.

Keep These Instructions and Read Them Over Once a Month!

Diet No. 1

(Low Cholesterol and Fat, Low Caloric)

kfast:

uit Juice: Orange, grapefruit, or pineapple juice, 1 glass.

OR

uits: Stewed or canned apricots, cherries, peaches or pears (without syrup) ½ cup.

reals: Oatmeal, cornmeal, Pablum, Puffed Rice or Puffed Wheat, Triscuit, ½ cup, with milk and not more than a half teaspoonful of sugar.

read: Whole wheat or white bread, ½ slice or ½ muffin or soft roll, toasted. With a half square of butter.

verage: Cal-C-Tose, milk (with top cream removed). Coffee, coffee substitutes, or weak tea, with milk and one lump or one level teaspoonful of sugar.

cheon or Supper:

lad: Lettuce with cooked vegetables as carrots, string beans, beets, peas, tomato, pear or pineapple. Vinegar or lemon juice only.

OR

ndwich: Whole wheat bread, thinly buttered, with plain cheese, cream cheese or lean meat as roast beef.

read: With salad a half slice of whole wheat or white bread, preferably toasted, thinly buttered.

essert: Stewed or canned fruit as for breakfast, junket, gelatine, apple sauce, or water ice.

verage: Glass of milk, buttermilk or weak tea, with milk and 1 lump or 1 level teaspoonful of sugar.

ner:

oup: Broth, consommé or bouillon, one small cup.

eat: Chicken; roast, broiled or boiled. Beef; lean round, sirloin or roast. Lamb; chops or roast. Without visible fat.

OR

sh: Any lean fish not fried as: cod, flounder, haddock, halibut, perch, whiting, bass.

egetables: Two cooked, green or colored, vegetables as for lunch (prepared without butter).

read: As for luncheon.

Diet No. 2

(Low Cholesterol and Fat, High Caloric)

Breakfast:

Fruit Juice: Orange, grapefruit, pineapple, or prune juice, swe[...] if desired.

OR

Fruits: Apple sauce, baked apple, or sliced banana, with crea[...] sugar.

Cereals: Shredded wheat (2 biscuits), Wheat Flakes, Corn F[...] Rice Flakes, Rice or Wheat Krispies, with milk and sugar. [...] may be added if desired. Or cooked as: Ralston, Cream of W[...] Hominy, boiled rice, cream of barley, or farina, with crea[...] sugar.

Bread: Whole wheat or white bread, toasted, 2 slices, with one s[...] of butter, jam, jelly or marmalade if desired.

Waffles: Waffles with syrup or honey may be substituted for [...] 2 or 3 times a week.

Beverages: Coffee, Sanka coffee, Kaffee Hag, or Postum with a t[...] spoonful of cream and 2 lumps of sugar. Weak tea with crea[...] sugar or one glass of milk.

Luncheon or Supper:

Juices: Tomato, pineapple, or vegetable juice without seasoning.

OR

Soups: Creamed soups made with milk, or vegetable soups with bar[...] okra, rice, macaroni, spaghetti or vermicelli.

Meat: Lean meat as: roast lamb, roast beef or steak.

Sandwich: Whole wheat or white bread, toasted, with roast beef, r[...] lamb, ham, plain cheese, jelly, etc.

OR

Salad: Lettuce with cooked carrots, string beans, beets, peas, tom[...] or pineapple. With French dressing, lemon juice or vinegar. W[...] cracker if desired.

OR

Vegetables: Potatoes: mashed, baked, or boiled. Two green or colo[...] vegetables as: carrots, wax or string beans, asparagus, beets, b[...] greens, cauliflower (crown part only), young lima beans, peas, lent[...] mushrooms, okra, squash, turnips, stewed tomatoes, vegeta[...] marrow.

Bread: Whole wheat, white bread (2 slices) or rolls, toasted wit[...] single square of butter may be taken with the vegetables. J[...] or jam if desired.

Dessert: Bananas, baked or fresh with milk and sugar. Cake, pl[...] sponge or cup. Stewed or canned fruits as: apricots, peac[...] pears. Apple sauce or baked apple with milk. Puddings [...] tapioca, rice, bread, cornstarch. Junket, Jell-O, gelatine.

Beverage: Glass of milk or weak tea, with milk and 2 lumps of suga[...]

Dinner:

Juice or *Soups:* As for luncheon.

Meat: (Meat or fish should be taken once daily). Roast beef, st[...] tenderloin, sirloin, or round. Lamb chops or roast. Chick[...] turkey, chopped meat. (Avoid fats and fried meats).

OR

Fish: Bass, blackfish, bluefish, cod, flounder, haddock, halibut st[...] perch, weakfish, whitefish, or boiled salmon. Served with lem[...] juice.

Vegetables: One starch and 2 green or colored vegetables. Potat[...] mashed, baked or boiled. Or macaroni, spaghetti or rice. W[...] colored vegetables as listed for luncheon.

Bread: As for luncheon.

rt: As for luncheon.
rage: Glass of milk, buttermilk or weak tea with milk and 2 lumps of sugar.
1. Cal-C-Tose or Hemo, milk, malted milk, Coco-malt or Ovaltine. Whenever possible a tablespoonful of dextrose or lactose should be added. With toast, bread sticks or zwieback.
. As at 10 A.M.
. As at 10 A.M.
One of each of the above groups should be taken; foods listed first are preferable. If there are digestive disturbances, all salads, raw fruits and raw vegetables should be omitted.
: Eggs and cream except as ordered. Fats, fried foods, greases, oils, pork, veal, thickened gravies. Inner organs as: liver, kidneys, sweetbreads, brains. All rich and highly seasoned foods, condiments. Roughage as: cabbage, corn cucumbers, celery, Brussels sprouts, raw apples, bran. Pies, pastries, chocolate. Alcohol and tobacco in moderation only.
This diet is low in fat and therefore deficient in Vitamins A and D, an adequate amount of which is necessary for the maintainance of good health. In order to correct this deficiency one of the multiple vitamin capsules is advised.

Diet No. 3A

(Bland Hyperacidity Diet with Intermediate Feedings)
fast: (8 A.M.)
its: Canned or stewed apricots, peaches or pears.
eals: Cooked as: oatmeal, Ralston, farina or cream of wheat; or prepared as: Puffed Rice or Puffed Wheat, with 2 tablespoonfuls of cream and ½ teaspoonful of sugar.
gs: One soft boiled or poached with ½ portion of butter as desired.
ad: White or whole wheat bread, zwieback or soft rolls, toasted with one square of butter.
verages: Milk, malted milk or ovaltine. Hemo or Cal-C-Tose may be added to milk for additional vitamins.
heon and *Supper:* (12 NOON and 6 P.M.)
gs: Soft boiled, coddled or poached with ½ square butter.
getables: 1 potato; boiled, baked or mashed, with ½ square of butter or a tablespoonful of cream. Or 1 cup of rice, steamed, with cream or butter. 2 green or colored vegetables, pureed or creamed as: carrots, asparagus tips, beets, string or young lima beans, peas, beet greens, spinach, squash, turnips or avocado (two tablespoonfuls). Pureed canned vegetables as Clapps or Gerbers are recommended.
ead: As for breakfast.
ssert: Stewed or canned fruits as: apricots, peaches or pears (2 tablespoonfuls). Baked banana, ice cream, soufflés, junket, Jell-O, custard, cornstarch or tapioca pudding. Boiled rice with cream and ½ teaspoonful of sugar.
verages: Milk, buttermilk, Ovaltine or Coco-malt, 1 glass.
M. Milk, malted milk, buttermilk or Ovaltine. Cal-C-Tose or Hemo, 1 teaspoonful, may be added to a glass of milk twice daily.
M. As at 10 A.M.
M. As at 10 A.M.
M. As at 10 A.M.
M. As at 10 A.M.
Feedings every two hours are essential.

D: Fruit juices, all sweet, sour and acid drinks and foods. Soups, bouillon, sauces, gravies, condiments. Meats, fish, shellfish, fats, fried foods. Hashed, pickled, salted and smoked foods. Rich and highly seasoned foods, pies, cakes, candies, pastries. Salads, raw

Avoid—(*Continued*)
fruits, and raw vegetables. Nuts, dates, figs, olives, salt and p
at table. Tea, coffee, coffee substitutes, chocolate, cocoa. R
age as: bran, whole wheat, apples, cabbage, Brussels sp
corn, onions. Alcohol and smoking.

Note: This restricted diet is temporary and is deficient in vitamins
order to correct this deficiency, one of the vitamin prepara
should be taken.

Diet No. 3B

(Bland Hyperacidity Maintenance Diet)

Breakfast: (8 A.M.)
Fruits: Stewed or canned fruits, apple sauce.
Cereals: Cooked gruel: Oatmeal, farina, Cream of Wheat, rice
rolled oats. Prepared: Puffed rice, Puffed Wheat, or Corn Fla
1 cup with 2 tablespoonfuls of cream and a half teaspoonful of su
Eggs: One soft boiled or poached egg with a half square of butter
a small pinch of salt.
Bread: Whole wheat, white bread, 1 slice, or soft roll toasted, wit
half portion of butter.
Beverage: Milk or malted milk, 1 glass. If there are no diges
symptoms, 1 cup of Postum or weak tea, with a tablespoonful
cream and 1 lump of sugar.

Luncheon or *Supper:* (12 NOON or 6 P.M.)
Juices: Tomato or other vegetable juice (without seasoning).
Sandwich: White or whole wheat bread, preferably toasted, with ro
beef, roast lamb, plain cheese or jelly.
OR
Vegetable Plate: One poached egg with two or three green or color
vegetables as: carrots, beets, asparagus tips, mushrooms, squas
beans, peas or vegetable marrow.
Bread: As for breakfast.
Dessert: Stewed or canned fruits as: pears, apricots or peache
Baked apple (without skin) or apple sauce. Jell-O, gelatin
custard, junket. Puddings as: cornstarch, rice, tapioca. I
cream, sherbets. Baked bananas.
Beverages: One glass of milk, malted milk, Ovaltine, or Cal-C-Tose.

Dinner: (12 NOON or 6 P.M.)
Juices: Tomato or other vegetable juice (without seasoning).
Meat: (Meat or fish once daily). Chopped meat, roast beef, roa
lamb, lamb chops, chicken, other than fried. Turkey.
OR
Fish: (Fish should not be taken more than two or three times a week
Lean fish, baked, boiled, broiled or steamed as: cod, flounde
haddock, halibut or perch.
Eggs: If eggs have not been taken at the other meals, two soft boile
or poached eggs may be substituted for the meat or fish.
Vegetables: One potato, mashed, baked or boiled, or starches as ma
aroni, rice or spaghetti may be occasionally substituted. Wit
one to two green or colored vegetables as: asparagus, beets, carrot
mushrooms, okra, pumpkin, squash, spinach, wax beans, tomatoe
green peas, vegetable marrow.
Dessert: As for luncheon.
Beverage: As for luncheon.

10 A.M. Milk, Cal-C-Tose, Coco-malt, or buttermilk, one glass. Wit
one egg if desired.
4 P.M. As at 10 A.M.
10 P.M. As at 10 A.M.

One of each of the above groups should be taken. Those list
first are preferable. The other foods may be taken occasional
for variety. If there are digestive disturbances, all salads, ra
fruits and raw vegetables should be omitted.

: Fats, fried foods, greases, thickened gravies, oils, pork, veal. Eggs, cream, and foods prepared from these. Inner organs as: liver, kidney, sweetbreads, brains. Nuts, avocado, olives, olive oil, salad dressings. Starchy foods as: bread, potatoes, macaroni, spaghetti. All rich and highly seasoned foods. Pies, cakes, pastries, candies, chocolate. Roughage as: cabbage, Brussels sprouts, raw apples, celery, cucumbers, bran. Pickled, smoked and salted foods. Condiments. Alcohol and smoking must be avoided.

One multiple vitamin capsule should be taken daily, after breakfast.

Diet No. 4

(Moderate Cholesterol and Fat, Low Caloric)

fast:

it Juice: Orange, grapefruit, or pineapple juice, 1 glass.

OR

it: Stewed or canned apricots, cherries, peaches or pears. Without syrup (½ cup).

gs: One soft boiled egg with a quarter square of butter and a small pinch of salt.

OR

eals: Oatmeal, Puffed Rice, Puffed Wheat or Triscuit, with milk and ½ teaspoonful of sugar. May be substituted for egg 2 or 3 times a week.

ead: Whole wheat, white bread, toasted, ½ slice, with a half square of butter.

verage: Ovaltine or whole milk with Hemo or Cal-C-Tose, 1 glass. Coffee, tea, or Postum with 1 lump of sugar and 1 tablespoonful of cream.

heon or *Supper:*

ices: Tomato or pineapple juice, a small glass.

OR

up: Bouillon, consommé or clear broth, 1 cup.

lads: Egg, cooked carrots, string beans, beets, peas, tomato, pear, or pineapple, with lemon juice or vinegar.

OR

gs: Two soft boiled or poached eggs with a half square of butter and a small pinch of salt may be taken once daily.

OR

getables: Vegetable plate, 2 green or colored vegetables, with an egg if desired.

ead: Whole wheat or white bread, toasted, ½ slice with ½ square of butter.

sserts: Stewed or canned fruits as for breakfast. Custard, junket, gelatine, apple sauce or water ice.

verage: Whole milk, 1 glass.

ner:

ices: Tomato, vegetable, or pineapple juice, 1 glass.

OR

up: Bouillon, consommé or clear broth, 1 cup.

eats: Chicken, other than fried. Beef; round, sirloin or roast. Liver, kidneys, sweetbreads or brains are to be taken at least 3 times a week.

OR

sh: Lean fish (not fried) as: cod, flounder, haddock, halibut, perch, whiting, bass, may be taken 2 or 3 times a week.

getables: Two green or colored vegetables other than those prohibited.

ead: As for luncheon.

sert: Stewed or canned fruit as: pears, peaches or apricots. Custard, Jell-O, gelatine or very ripe fruits, without skins or seeds.

Beverage: Coffee (demi tasse), weak tea, or Postum with milk lump of sugar.

10 A.M. Glass of milk.

4 P.M. Glass of malted milk or cup of tea with a teaspoonful of and 1 lump of sugar.

10 P.M. Glass of milk, malted milk or Ovaltine.

One of each of the above groups should be taken. Those first are preferable; the other foods may be taken occasionall variety. If there are digestive disturbances, all salads, raw and raw vegetables should be omitted.

AVOID: Fats, fried foods, pork, shell-fish. Thickened gravies, ri highly seasoned foods, sauces, condiments, salt and pepp table. Pickled, smoked and salted foods. Roughage as: bage, Brussels sprouts, nuts, celery, bran. Pastries, pies, candies, chocolate, cocoa. Alcohol and carbonated drinks. S ing in moderation only.

Note: A moderate amount of food high in cholesterol and high in has been added to the diet in order to stimulate the emptyi the gall-bladder. The foods high in cholesterol are eggs and organs as liver, kidney and sweetbreads. It is important these foods be used periodically as directed.

Diet No. 5

(RELATIVELY HIGH CHOLESTEROL AND FAT, HIGH CALORIC)

Breakfast:

Fruit Juices: Orange, grapefruit, or pineapple juice, with 1 tablespoo of sugar.

OR

Fruits: Baked apple, apple sauce or banana, with a tablespoonfu cream and a teaspoonful of sugar.

Eggs: Two soft boiled or poached eggs with 2 slices of crisp ba if desired.

Cereals: May be substituted for eggs 2 or 3 times a week. Cooked oatmeal, Cream of Wheat, Wheatena, farina, cornmeal or homi Or prepared as: Corn Flakes, Rice Flakes, or shredded wh with 2 tablespoonfuls of cream and a teaspoonful of sugar.

OR

Waffles: May be substituted for eggs instead of cereal twice a we with syrup and butter.

Bread: Whole wheat or white bread, 2 slices or 2 soft rolls, toas with butter, jam or marmalade if desired.

Beverage: Cal-C-Tose, milk, malted milk, Ovaltine, coffee or tea, w 2 tablespoonfuls of cream and 2 lumps of sugar.

Luncheon or *Supper:*

Juices: Tomato or other vegetable juice (without added seasonir

Soups: Creamed soups as desired, or consommé with barley, nood rice spaghetti or vermicelli.

Sandwich: Whole wheat or white bread, toasted with butter and e chicken ham or plain cheese.

OR

Salads: Lettuce with cooked vegetables or canned fruits as: str beans, peas, carrots, pineapple, pears or peaches, with salad dress

OR

Vegetables: Vegetable plate with poached egg and 3 green or colo vegetables.

Bread: As for breakfast with jam or jelly if desired.

Beverage: Glass of milk, malted milk, Ovaltine or Cal-C-Tose, w an ounce of cream. Or tea with 2 tablespoonfuls of cream 2 lumps of sugar.

Dessert: As for dinner.

es: Tomato or other vegetable juice (without added seasoning).
ps: As for luncheon.
t: (Meat or fish once daily). Chicken, other than fried. Turkey, beef, roast or broiled, steak; tenderloin, sirloin or round. Chopped meat, lamb chops or roast lamb.
R
: Baked, boiled or broiled lean fish may be taken 2 or 3 times a week.
tables: Two potatoes, mashed, baked or boiled with 1 square of butter. Rice, macaroni or spaghetti with tomato sauce may be occasionally substituted if desired. Two green or colored vegetables (other than those to be omitted) as: carrots, asparagus, beets, beet greens, wax or string beans, lentils, mushrooms, okra, peas, parsnips, spinach, squash, stewed tomatoes, turnips, vegetable marrow. Avocado may be taken if desired with dressing.
ad: As for breakfast with jam or jelly if desired.
sserts: Apple sauce, baked apple, apple snow, apple tapioca. Stewed or canned apricots, plums, pears or peaches. Banana (baked or ripe), Irish or lemon blanc mange, Brown Betty, bread, cornstarch or rice pudding. Prunes (stewed or pureed), ice cream, Jell-O, junket. Cakes: cup, sponge or plain pound. Custard. American or Edam cheese. In season, very ripe fruits as bananas, apricots, peaches or pears, without skins or seeds.
verage: As for luncheon.
.M. Glass of milk with 2 tablespoonfuls of cream or an egg.
.M. As at 10 A.M. or tea with cream and sugar. Crackers or cakes.
.M. Glass of milk, malted milk or Ovaltine.

One of each of the above groups should be taken. Those listed first are preferable; the other foods may be taken occasionally for variety. If there are digestive disturbances, coffee, salads, raw fruits and raw vegetables should be omitted.

D: Meat fats, fried foods, pork, shell fish. Thickened gravies, sauces, all rich and highly seasoned foods. Condiments. Salt and pepper at the table. Pickled and smoked foods. Roughage as: apples, cabbage, cauliflower, corn, Brussels sprouts, Bran products. Nuts, dates, figs. Carbonated drinks. Alcohol. Pastries, pies, cocoa and chocolate.

: A moderate amount of food high in cholesterol and high in fats has been added to the diet in order to stimulate the emptying of the gall bladder. The foods high in cholesterol are eggs and inner organs as liver, kidney and sweetbreads. It is important that these foods be used periodically as directed.

Diet No. 6

(HIGH CARBOHYDRATE, HIGH PROTEIN, MODERATE FAT AND HIGH CALORIC)

kfast:
uits: Orange or grapefruit juice, with a teaspoonful of sugar. Or baked apple, apple sauce, bananas or stewed prunes, with a tablespoonful of cream and a teaspoonful of sugar.
reals: Oatmeal, any dark cereal, hominy. Or prepared cereal with two tablespoonfuls of cream and a teaspoonful of sugar.
ggs: Two as desired. With 3 slices of lean bacon.
eat: Chops or steak may be taken instead of eggs and bacon.
affles: Waffles with syrup and one square of butter may be substituted for cereals 2 or 3 times a week.
read: Whole wheat or white bread, 2 slices, toasted with jam, jelly or marmalade.
verage: Ovaltine, Coco-malt or milk with Hemo or Cal-C-Tose. Or coffee, tea or postum with one tablespoonful of cream and 2 lumps of sugar.

Luncheon or Supper:

Juices: Tomato or vegetable juice (without added seasoning).

OR

Soups: Consommé, bouillon or vegetable.

Meat: Lean meat, lean fish should be taken twice daily.

Sandwiches: Two sandwiches, toasted whole wheat or white b with cream or plain cheese, eggs, jelly, jam, meat.

OR

Vegetables: A vegetable plate with a poached egg may be taken 3 times a week. Mashed or baked potatoes may be taken wi half square of butter.

Salads: Lettuce with cooked vegetables or stewed or canned fr may be taken as: peas, carrots, string beans, peaches, or pe With mineral oil salad dressing or cream cheese.

Bread: As for breakfast.

Dessert: Stewed or canned fruits. Cornstarch, rice, bread or tapi pudding. Baked apple or apple sauce. Baked or fresh ban with milk and sugar. Irish or lemon blanc mange. Cake: plain or sponge. Custards. Jell-O, gelatine, Junket. Very fruits without skins or seeds.

Beverage: Glass of Cal-C-Tose, milk or malted milk.

Dinner:

Juices: Tomato or other vegetable juice (without added seasoni

Soups: Creamed soups (made with milk), bouillon, consommé or br with rice, barley, macaroni or noodles.

Meats: A liberal portion of lean meat is to be included in 2 me each day.

Vegetables: Potatoes, mashed, baked or boiled with a half square butter. Or macaroni, rice or spaghetti with ½ square of butter a tablespoonful of cream. With two green or colored vegetab as: carrots, asparagus, beets, beet greens, peas, pumpkin, stri or wax beans, stewed tomatoes, turnips, vegetable marrow.

Bread: As for luncheon.

Desserts: As for luncheon.

Beverage: As for luncheon.

10 A.M. Glass of milk, malted milk or Coco-malt. To milk may be adde 2 teaspoonfuls of Hemo or Cal-C-Tose. To be taken with zweibac crackers, toast or arrowroot crackers.

4 P.M. As at 10 A.M.

10 P.M. As at 10 A.M.

One food should be selected from each group. Those listed fir are preferable. With digestive symptoms, all salads, raw fruit raw vegetables should be omitted.

AVOID: Fats, fried foods, greases, oils, pork, veal, thickened sauce gravies. Liver, kidneys, sweetbreads, brains. All other meat Shell fish and fish unless specifically ordered. Nuts, dates, olive condiments, sauces. Salted, pickled and smoked foods. Roughag as: bran, cabbage, Brussels sprouts, celery, cucumbers. Pie cakes, candies, chocolate.

Note: To supplement the protein intake, 2 tablespoonfuls of amino ac preparation, such as amigen, or aminoids, should be taken on daily.

Once daily, 2 tablespoonfuls of Brewer's Yeast powder should b taken in a glass of milk; if desired, flavored with vanilla and nutme

Bridges' Diet for Chronic Cholecystitis and Mucous Colitis.

Owing to the great prevalence of the coëxistence of chronic chol cystitis and chronic mucous colitis, the physician is frequentl called upon to prescribe a diet which will be relatively innocuous t

of these conditions and at the same time yield sufficient caloric to maintain body nutrition.

rule, it can be easily determined which of the two pathologies more predominating. A diet directed at the major condition fficiently meet the diet-therapeutic indication. It has been in isolated instances, with the coëxistence of these two condi- surgical intervention directed against the diseased gall-bladder perative in order to enable the patient to assimilate a diet le of meeting the nutritional needs.

necessary diet involves a *low-fat, low-residue* regimen. Both se restrictions limit the vitamin intake (refer to pp. 50, 52). nin supplements, therefore, become highly desirable if a satis- ry nutritional state is to be secured and maintained.

sic menus of the type found elsewhere in this book are presented with reference to the cholesterol content of the diet.

Low-cholesterol Diet.

Typical Menu.

essary to modify the residue, serve puréed fruits and vegetables and omit salads.)

fast:
uit
oked cereal with milk and sugar
ast *or* roll with jam *or* marmalade
ffee *or* tea with milk and sugar

heon:
oice: potato, macaroni, noodles, rice, spaghetti, vermicelli
oked vegetables, except broccoli, Brussels sprouts, cabbage, cauliflower corn, onions, turnips
lad with lemon juice
ead with jelly
esh *or* stewed fruit
ilk *or* tea with lemon

er:
an meat *or* fish, except: brains, kidneys, liver *or* sweetbreads
otato
oked vegetables, except broccoli, Brussels sprouts, cabbage, cauliflower, corn, onions, turnips
elba toast, breadsticks, Zwieback
resh *or* stewed fruit
offee with milk and sugar

High-cholesterol Diet.

Typical Menu.

ecessary to modify the residue, serve puréed fruits and vegetables and omit salads.)

kfast:
ruit
ooked cereal with cream and sugar
eggs, except fried
oast *or* rolls with generous amount of butter
ilk *or* coffee with cream and sugar

Luncheon:
- Meat, fish, eggs or cheese
  - *Use three times weekly: brains, kidney, liver, sweetbreads*
- Cooked vegetable, except broccoli, Brussels sprouts, cabbage, cauli[fl...] corn, onions, turnips
- Salad with dressing
- Bread with generous amount of butter
- Fresh *or* stewed fruit
- Milk

Dinner:
- Meat *or* fish
- Potato with generous amount of butter
- Cooked vegetable, except broccoli, Brussels sprouts, cabbage, caulifl[...] corn, onions, turnips
- Bread with generous amount of butter
- Simple pudding made with milk and eggs
- Milk *or* coffee with cream and sugar

GASTRIC ATONY.

CLARENCE FULLER, M. D.

Discussion.—As the term indicates, the stomach, due to loss of to[ne] is incapable of properly evacuating its contents.

Patients affected with gastric atony should eat small quantitie[s of] food at regular and frequent intervals. The quantity of fluids shou[ld] not exceed one and one-half quarts per day. Reference should [be] made to the list of foods containing less than 25 per cent water a[nd] a selected group of these foods may be infiltrated into the diet. I[n] this way, proper caloric value can be better maintained without i[n]creasing the volumetric ingestion. Fluids should be taken in sma[ll] amounts, not more than 4 oz. at one time.

The diet should be varied according to the gastric acidity; in case[s] with hyperacidity, foods stimulating secretion of acid should b[e] eliminated (see Diet in Ulcer, Peptic) but liberal amounts of protei[n] are allowed because of their neutralizing effect on gastric acidity; [if] there is sub- or anacidity, foods stimulating acid secretion (q. v.) should be taken. Coarse vegetables should be eliminated, and a[ll] vegetables preferably pureed.

Typical Menu.

6 A.M.	Diluted fruit purée
8 A.M.	Cooked cereal with cream and sugar
	Hot milk and cream flavored with coffee and suga[r]
10 A.M.	Soft-cooked egg
	Toast with butter
12 NOON.	Thick cream of vegetable soup with crackers
	Baked custard *or* pudding
2 P.M.	Boiled rice with cream and sugar
4 P.M.	Apple sauce or puréed fruit
	Toast with butter
6 P.M.	Minced meat
	Baked *or* mashed potato with butter
	Ice-cream or pudding
8 P.M.	Hot milk or cocoa
	Toasted crackers with butter

estions.—Infrequently, in very severe cases a Sippy diet t the administration of alkalies has been successful. This diet commence with the beginning of the second week and con- hereafter. Dried milk preparations, malted milk and eggs, to any beverage, can supplement the menus.

GASTROPTOSIS.

Clarence Fuller, M. D.

troptosis per se does not exist, and is not a clinical entity; if omach functions normally it's position does not matter. The nent is that of the patient as a whole, and not directed at toms attributable to the malposition of any one organ.

OSURIA, ALIMENTARY AND RENAL, AND GLYCOSURIA OF PREGNANCY.

cussion.—Irrespective of the variance of opinion concerning fferentiation between renal and alimentary glycosuria together heir relationship to true diabetes, the practitioner is frequently upon to prescribe a dietary for the non-diabetic glycosuric. s especially true of patients who complain of pruritus vulvæ.

e principles of the dietary are such that the carbohydrates noderately limited, whereas the quantity of ingested fats and ins is generally disregarded.

Typical Menu.

kfast:
sweetened fruit juice
gs or bacon
e slice whole grain toast with butter
ffee with cream

heon:
eat, fish *or* cheese
oked vegetable with butter
lad with dressing
esh or water-packed fruit
ilk

ner:
eat *or* fish
oked vegetables with butter
lad with dressing
esh or water-packed fruit
ffee with cream

ggestions.—Some of the sugar substitutes such as saccharin, , crystallose, etc., may be used to replace cane sugar.

e diet in renal diabetes and the not uncommon glycosuria egnancy is the same as the foregoing.

trate of magnesia and compound licorice powder among other cations are specifically contraindicated due to their sugar ent.

Commonly a pseudoglucose urinary reaction is obtained i
presence of salicylate or salicylic acid derivative and hexam
amin therapy which could readily be misinterpreted as o
genuine glycosuria.

Before instituting dietary therapy for a presenting "glycos
the nature of the urinary sugar should be ascertained.

GOITER.

J. William Hinton, M.D.

Discussion.—In the belief that a deficiency of iodine in the
is the chief factor in the etiology of simple thyroid enlargemen
has become well established, by repeated demonstrations of
phylaxis and cures both in experimental animals and in man,
such is the case. Attention was definitely fixed on the rôle of io
in the simple diffuse goiter by Baumann's work in 1895, and t
iodine contained in materials such as sea salt, ashes of sponges a
seaweeds are ancient remedies for simple goiter. As might
expected, simple goiter in man is chiefly regional in occurrence a
the localities which have the highest incidence of goiter include
Alpine regions of Switzerland, Italy and France, southern Germa
and southern Austria; the Himalayan districts of India; the An
region of South America; and, on the North American continent, t
Great Lakes basin, the Cascade Mountain region of Oregon, Was
ington and British Columbia, and to a lesser degree the Appalachi
Mountain region, and the Rocky Mountain states. The easte
seacoast is comparatively free from simple goiter.

The mode of action of iodine in the organism is not entirely clea
The minute quantities of this substance involving the metabolis
of the thyroid have made analytical procedures difficult to car
out; however, through the combining of known factors of goit
incidence with such chemical studies as are possible, it is know
that the food and water supply of goiter areas are deficient in iodi
in comparison to the seacoast. A properly balanced diet w
prevent the development of a simple diffuse goiter, providing the
is a sufficient iodine content.

It is known that the green leafy vegetables contain the highe
percentage of iodine with the root vegetables next in order, a
cereals showing a very small iodine content. McClendon and Hat
away have called attention to the vegetables from Maine and Co
necticut containing more iodine than those from Minnesota a
Oregon; and Weston and Remington, working with the Sou
Carolina Natural Resources Commission, have called attention
the relatively high percentage of iodine in the different vegetabl
from the state of South Carolina. They suggest that the princip
source of iodine is from the disintegration of granite rocks suppl
mented by the use of commercial fertilizer. The influence of t
sea is not beyond a narrow belt of the coast. They used the dete
mination of iodine content of potatoes to show the relation
iodine in the vegetables to the distance from the sea, and when t

is expressed in parts per billion of the dry basis, there is a percentage in a radius 20 miles from the coast, than there distance of 50 miles. Sea foods are very rich in iodine, but goiter belts these are difficult to obtain; Jarvis, Clough and , however, have called attention to the use of salmon in the diet e prophylaxis of goiter, and state that the systematic use of ods which are rich in iodine would be of considerable benefit treatment of simple goiter. They lay particular emphasis on d salmon on account of its cheapness and availability for ylactic purposes.

e iodine content of vegetables and sea foods is not appre- altered during the process of cooking. Canned salmon has ically the same iodine value as the fresh salmon, and Adolph Prochaska carried out experiments to determine what changes, , take place in the iodine contents of vegetables on cooking, they found that cooking vegetables in water did not alter the e value.

Typical Menu.

kfast:

uit
ooked whole grain cereal with cream and sugar
gg, except fried
hole grain toast *or* roll with butter
ilk *or* hot milk flavored with coffee and sugar

cheon:

hoice: Meat, fish, eggs *or* cheese
ooked vegetable with butter
alad with dressing
Whole grain bread with butter
resh *or* stewed fruit
Iilk

nner:

Ieat *or* fish
(*Use fish twice weekly*)
otato with butter
ooked vegetable with butter
Whole grain bread with butter
imple dessert *or* fruit
Iilk

OTE.—Whereas it is to be noted that the crustacea and mol- s have a high iodine content it is also recognized that their avail- ity throughout the world is very uncertain. Substitutes must utilized in such instances.

uggestions.—From clinical observations it is known that the ple diffuse goiter developing during adolescence will spontane- ly involute in a much higher percentage of children if they are en from the goiter belt and live at the seacoast. This is chiefly to the iodine content in the diet and drinking water.

The thyroid enlargement is not solely due to an iodine defi
but there is apparently some alteration of the protein metab
whereby the amino-acid metabolism is disturbed and ty
not normally produced. As thyroxine is derived from tyr
according to the work of Harington and Randall, the thyroid g
hypertrophies due to the thyroxine deficiency. Davis and H
have been able to produce colloid goiters in dogs by altering
protein metabolism, whereby the tyrosine was not normally for

It appears that, if a person is put on a proper iodine bala
simple goiter will not develop, but if the food and water suppl
deficient in iodine, this in turn alters the normal body metabo
with a resulting thyroid enlargement. Refer to the list of F
Highest in Iodine, as well as to the iodine table in the Appendi

GONORRHEA.

Refer to page 578.

GOUT.

Discussion.—Gout is a condition of disturbed purin metabolis
It is characterized by the deposition of monosodium urate in vari
tissues, particularly the joints. The joint most commonly affect
is the great toe. Coincidentally, there is determinable an elevat
blood uric acid.

By and large, the general incidence of gout in the past decade
low. However, with the specialization which medicine has unde
gone, these cases are most commonly observed in orthopedic clinic

The regimen for gout resolves itself into a management
uric-acid diathesis with a marked stringency of diet for those cas
presenting acute symptoms.

Curiously, it has been demonstrated that during an acute attac
of gout the urinary uric-acid output is found to be normal or
times lower than normal. It would appear that the body, during a
attack, retains uric acid to a greater extent than during the interva
between attacks.

During the acute attack great restriction in diet should
insisted upon and the foods should be as purin-free as possible, r
stricted in quantity and relatively low in protein. This restricti
in protein during an acute attack will not be found to be detrimenta
due to the fact that the maintenance of the diet for acute go
is rarely instituted over any great period of time. The calor
value of the daily menu for the same reason may be disregarde
The insistence on large quantities of fluids is universally acknow
edged as being of prime importance. Needless to say, *alcohol*
any form is positively forbidden.

The dietary regimen resolves itself into two parts. The first
what may be called a "positive" diet, owing to the fact that a
foods with a few exceptions are prohibited. The foods from whic
the diet is to be exclusively drawn follow.

ed.

:
ples
ricots
ocado
nanas
ckberries
ieberries
erries
apes
ganberries
elons
anges
aches
ars
neapple
ums
aspberries
rawberries
omatoes
atermelon

Dairy products:
Butter
Buttermilk
Cheese
Cream
Eggs
Milk

Cereals:
Barley
Cream of Wheat
Farina
Grits
Hominy
Oatmeal
Rice
Sago
Tapioca
Wheatena

Bread:
Cakes
Rye bread
Rolls
White bread
Wheat products

Nuts:
Almonds
Hazelnuts
Walnuts

Miscellaneous:
Alimentary pastes
Gelatin
Olives
Sugars
Syrups

Vegetables—all except:
Asparagus
Eggplant
Green peas
Lima beans
Mushrooms
Spinach
Split peas
String beans

These foods should be liberally utilized.

OTE.—Salt, spices and other seasonings are to be limited.

ACUTE STAGE.

Typical Menu.

akfast:
ruit
ooked cereal with milk and sugar
oast or rolls with butter
Iilk

lmorning:
ruit juice

nner:
hoice: Potato, macaroni, noodles, rice, spaghetti, vermicelli
ooked vegetables
alad with dressing
read with butter
tewed fruit

lafternoon:
Iilk *or* buttermilk

pper:
ggs *or* cheese
otato, baked or mashed
ooked vegetable
tewed fruit

ltime:
resh fruit *or* milk

OTE.—At least 8 glasses of water are to be taken daily.

The second part, which is not so limited, and which shou instituted immediately after the subsidence of very acute symp consists of a diet in which the following foods are to be omitted with the first dietary, the advisability of large quantities of should be respected. It should be noted that cocoa is a perm beverage (see pages 567 and 727).

Omit.

Alcohol	Fish roe	Prepared soup co trates or cubes
Asparagus	Heart	Rabbit
Beef	Goose	Shellfish
Brains	Kidneys	Soups, stock
Broths	Legumes	Spinach
Cauliflower	Liver	Sweetbreads
Chicken	Meat gravies	Tea
Coffee	Mushrooms	Tongue
Duck and all game	Mutton	Veal
Eggplant	Pancreas	Yeast
Fish	Pork	

Typical Menu.

Breakfast:
Fruit
Cooked cereal with cream and sugar
Toast *or* rolls with butter
Milk

Luncheon:
Choice: potatoes, macaroni, noodles, rice, spaghetti, vermicelli
Cooked vegetables
Salad with dressing
Bread with butter
Stewed fruit
Milk

Dinner:
Cream of vegetable soup
Eggs *or* cheese
Potato
Cooked vegetable
Salad with dressing
Bread with butter
Fresh or stewed fruit
Milk

Suggestions.—The amount of food either in acute or chro gout should be markedly limited. Overeating is well recognized being capable of precipitating an acute attack.

Very commonly we find obesity and gout associated. When t is present, further selective restrictions of the diet outlined for g should be made. This consists in substituting foods of low-calo value in place of those with a higher caloric content.

rence can be made to the different tables designating the c caloric value of various foods.

an be readily seen that this type of diet should not be enforced y great length of time as the chief offending factor in the the decrease in allowed protein. The continuation of such a otein diet will cause a marked depletion of physical vitality roduce anemia.

ases of chronic gout the regimen and diet for uric-acid dia- are recommended.

GYNECOLOGICAL AND OBSTETRICAL CONDITIONS

MORTIMER N. HYAMS, M.D.

roduction.—The importance of diet in obstetrics and gyne- y has been vividly brought to the attention of the medical ssion through the reports of experimental and clinical obser- ns during the past decade. In obstetrics primarily, the need tetic knowledge is paramount, both as a prophylactic as well therapeutic measure during pregnancy and the puerperium. neet the demands of metabolic, endocrinologic and physical ges constantly taking place from impregnation to the termina- of labor, restitution and lactation, the body must be supplied the necessary food elements, vitamins and minerals in a tity adequate to the needs of the individual patient.

e definite nutritive properties of the ten most important amino- s have been clinically demonstrated. In conjunction with vita- and minerals they constitute the necessary vital components of s serving as a prophylactic against nutritional deficiencies.

heir physiological utility is independent of their energy value, protein in adequate amount will supply all the amino-acids nec- ry for the repair and growth of the tissue.

arious conditions occurring in both gynecology and obstetrics be discussed relative to their association with food elements.

e diet for the menstruating woman need not differ from that at other times. A moderate increase in exogenous fluids is able, however, to replace the tissue fluid loss. With an in- sed blood loss not sufficient to constitute a hemorrhage, but in s of the amount normal for the particular woman, protein intake t be increased.

enorrhagia-Metrorrhagia.—When menstruation is excessive, r comenstrual or intermenstrual, the determination of the cause paramount importance. In some instances, treatment cannot nstituted immediately due to the profound anemia present.

ood transfusion, together with an appropriate diet, is necessary re the cause of the condition can be eliminated.

emia is usually of the hypochromic type. The diet must be in- sed in quality and quantity using, especially, those foods with a ionizable iron content, such as: almonds, broken chestnuts, uts, dried apricots, dried prunes, endive, boiled spinach, cocoa der, raw beef, roast lean beef, baked heart, kidney stew, lamb

and ox liver, roast mutton, cooked tongue, roast veal, fried
chops, canned sardines, eggs.

Protein foods should predominate.

Fertility and Sterility.—**Discussion.**—Physiologic researc
biochemic investigations, both animal and human, have demons
ted that nutrition plays an important rôle in some of the prob
in the field of fertility and sterility.

Reynolds and Macomber proved the effect of diet on this me
ism. They found that by eliminating certain essential elements
the diet the fertility index in animals could by lowered at will
the mating became sterile. On the other hand, sterile matings
low index could be rendered fertile by the addition of certain
elements. This principle has been successfully applied in impro
the fertility of animals in captivity and in treating sterility in hu
unions, when mechanical and other causes have been excluded in b
partners. The authors conclude that effective diet produces st
ity by causing a partial or complete functional inactivity in the te
or ovaries, as a result of which these organs fail to produce or rel
capable spermatozoa or ova.

While the problem of feeding human beings for high fertility
the one hand and for its restoration or awakening on the other can
be analysed and checked up as in the case of laboratory anim
the results so far achieved have inspired hope and given assura
of continued improvement in the future. There is no satisfacto
clinical proof that Vitamin E deficiency is present in cases of ste
ity.

Another sequel of dietary error or deficiency, although not p
venting conception, is noted in those cases in which the vitality
the germ cells is so affected that the growing embryo is able
attain only a certain stage of development as the result of prolong
use of a defective diet. Active growth then stops, nutrition fa
and death of the embryo ultimately occurs, followed by abortio
It is, therefore, important to regulate the diet of both prospecti
mothers and fathers as a precautionary measure. It may me
the difference between a normal pregnancy and parturition, a
an abnormal termination with all the complications which follo
such an occurrence.

Some cases of one child sterility are perhaps due to mothe
remaining an invalid after pregnancy because of a deficient di
the defect in minerals acting upon the hypophysis and ovary, resu
ing in an abnormal function. It has been suggested that diet a
pluriglandular dystrophy may be associated with or responsible f
diminution of the folliculin-producing principle in the ovary and t
placenta, which controls spontaneous contraction and the termin
tion of gestation, and thereby leads, in some cases, to prematuri
or pathologic postmaturity. Much has appeared in the literatu
regarding Rh factor determination. Whether it be negative or po
itive, it apparently has no effect on diet.

Pregnancy.—**Discussion.**—The dietary problem in pregnancy
comparatively simple and should not be made complicated for t

...t. No special dietary restrictions need be advised except ...s are usual and adequate for the normal woman: as the process ...siologic in the majority of cases, the nutritional regulation ...l be based upon that assumption. Pathologic conditions ... they arise are to be met and dealt with individually, and ...ding to the circumstances, which may vary in some cases. ...roper amounts of adequate nutrients must be furnished for ...aintenance of the mother and for the development of the fetus. ...tion to the diet of women before pregnancy occurs is important, ...vent defects in the future fetus.

...ring the first half of pregnancy the woman's metabolic rate is ...ppreciably changed. In the fifteenth week it is about 1.5 per ...below normal. After the fourth month it gradually increases, ... a few days before delivery when it is about 23 per cent above ...ormal. At this time there is an increase of about 14 per cent, ... pounds, in body weight. Following delivery, there is a gradual ...n the mother's basal metabolism to about 9.5 per cent below ...riginal rate.

...e mother requires no increase in caloric intake until the fourth ...h of pregnancy. After this, her needs gradually increase ... the end of the ninth month. Her caloric intake should then ...bout 20 per cent higher than at the beginning of pregnancy.

... woman of ordinary size and sedentary habits should ingest ...t 2500 Calories a day. An excess of 3000 Calories is rarely ...ssary, even in an active woman, except under special cir...stances. If the patient is underweight, additional food is per...ed. If overweight, a reduction diet is indicated. It is not ...he woman's advantage to add weight over and above that of ... increase demanded by the growing fetus.

...e protein intake should average 100 grams daily, selecting ...s of high biologic value, such as milk, milk products, eggs, meat, ... and vegetables. Elements, as calcium, phosphorus and iron, ...ssential because there is a tendency to demineralization of the ...ernal tissues, especially of the bones and teeth, unless an ade...e supply is furnished by the food. The restriction of calcium, ...e assumption that it will facilitate labor by making the cranial ...s of the fetus softer and thus aid in molding and expulsion, is ...e condemned. There is nothing to prove the correctness of ... a theory, and all that can be said in regard to this practice is ... danger and disaster may ensue.

...ilk as a food, because of the calcium and protein it contains, is ...ly important. It is deficient in iron and this should be supplied ...dded feedings of eggs, green vegetables and whole grain cereals ...fficient quantity. The restriction of protein, especially meat, ...der to "spare the kidneys" has no physiologic or chemical foun...on and no proved influence in the development or susceptibility ...-called "kidney trouble," and is unjustifiable. An ideal way ...eeting and satisfying the daily protein, mineral and vitamin ...ry requirements is to provide *one salad, two liberal servings of ... vegetables, with 1 or 2 eggs, 1 quart of milk, fruit and an adequate*

serving of fish or meat. In those cases in which the necessary q
tity of milk required is not well borne, various milk products
be substituted with satisfactory results. Cheese, custards, c
and junkets may be used for this purpose. Cereals, cream, b
and bread can make up the required caloric value.

While the diet should at all times be generous, it is not advi
to encourage the patient to overeat on the assumption that t
are two to feed instead of one. Overeating leads to indigest
constipation and toxemia.

A very important item, not properly classed as a food, in s
of the fact that it forms a large percentage of the bulk of m
foods, is water. It should be taken liberally, unless contraindica
by some pathologic condition. If necessary, the patient must
educated to take water regularly between meals. This may be c
but must not be iced lest chilling or indigestion ensue. Once
quired, this habit usually remains well fixed in the daily life of
patient, producing results which will be of benefit to her fut
health and well-being.

The vitamins are important in the maintenance of normal pr
nancy. Deficiency of vitamin C and D together with lack of c
cium and phosphorus are thought to favor gingivitis, dental cari
muscular weakness, spasmodic cramps in the legs and arms, tach
cardia and tetany. Deficiency of vitamin D alone causes the sk
of the infant to be softer than normal, the epiphyseal lines partic
larly of the metacarpals to be fringed and poorly calcified, and t
teeth, when erupted, to become grossly hypoplastic. There appea
to be unusual susceptibility at this time to dental caries; this is ge
erally attributed to calcium deficiency. Excess calcium results
increased ossification and growth of the skeletal structure, partic
larly of the fetal skull. Vitamin D deficiency is seldom recognize
It has been estimated that in almost two out of three pregnanci
deficiency of vitamin C exists. The value of vitamin E in obstetri
is generally disputed. Vitamin K is finding increasing use before a
after the onset of labor for the control of postpartum hemorrhage a
for protection of the child against internal bleeding due to bir
trauma. Post-partum polyneuritis is attributable to lack of thiami
this vitamin being removed from the body in additional amounts du
ing lactation. The vitamin requirements during pregnancy a
lactation are given elsewhere. Reference should also be ma
to the entire vitamin section.

It has been claimed that a salt-free restricted diet given the la
four to six weeks of pregnancy shortens the first and second stag
of labor and makes for a less painful delivery. This has not bee
substantiated by our own experience.

Conn, Vant and Malone have outlined a simple formula by mea
of which the diet may be planned throughout pregnancy and lact
tion. It is based on a daily intake of:

1 quart of milk, supplemented twice weekly with cheese
2 cups of vegetables, 1 fresh if possible
1 cup of fruit; citrus fruits or canned tomatoes thrice weekly

cup of cooked whole cereal, supplemented two to three days each month with uncooked wheat-germ
ledium serving of meat, fish, fowl or eggs with liver added once weekly

is regimen will furnish sufficient protein, minerals and vitamins aintain resistance, well-being, and fetal growth. To supply y and make the diet attractive and satisfying, such foods as l, potatoes, macaroni, rice, crackers, cakes, sugar, jelly, jam, , butter, cream and salad oils are added in amounts dictated ne appetite and regulated by the gain in weight.

has been suggested that a woman in the latter half of pregnancy out 56 kilogram weight requires 2400 calories consisting of:

grams protein	1.5 milligrams B_1
grams calcium	100 milligrams vitamin C
milligrams Iron	2.5 milligrams Riboflavin
Int. units vitamin A	15 milligrams nicotinic acid
Int. units vitamin D	

ss than 75 grams protein daily intake during this period will lt in an infant which will tend to be short, light in weight and t likely to receive a low pediatric rating in other respects.

omiting of Pregnancy.—Discussion.—Degrees of gastric distress, ying from the simple morning nausea to pernicious vomiting, occur in pregnancy. The causative factors have been attrib- d to a neurotic tendency, a reflex influence or to a definite tox- a. Investigation has demonstrated that some disturbance of carbohydrate metabolism is probably an etiologic factor. Elim- ting the reflex irritation caused by some pathologic lesion in the vic organs, such as uterine displacement, anteflexion, pelvic ad- ions, ovarian cysts, etc., vomiting is, at the present time, consider- to be a metabolic disturbance, either alone or combined with a chic or neurotic derangement. It is always important to ascer- whether or not the vomiting is of toxic origin, in order that proper atment be instituted early, no matter how mild the symptoms y be. Reflex influences should be corrected before the symptoms ome pernicious, a condition often difficult to relieve.

Excellent results very often follow simple dietary measures. A cup hot coffee or tea with a cracker, to be taken on awakening in morning and in bed before arising, followed by a bland diet ing the balance of the day, is often sufficient. The odor of king sometimes produces nausea, and when this causative factor emoved some patients are immediately relieved. Small meals uld be given at three-hour intervals, consisting mainly of car- ydrates—cereals, sugar, bread, crackers, fresh and leafy vege- les and fruits. Fats and proteins are contraindicated. Char- l and bismuth, cerium oxalate or sodium bicarbonate internally, ee or four times a day, are sometimes useful. A colitis may se pernicious vomiting during pregnancy and the vomiting ally subsides when this primary cause is relieved.

n the pernicious type the treatment is partly dependent upon etiology, but regardless of its origin eliminating focal infections

and reflex tendencies is essential. The patient must have abs rest in bed, with competent nursing. Lynch advocates nothing mouth and the rectal administration of glucose, bromides and to be continued until all vomiting ceases. He also favors a diet, high in caloric value and free from proteins, in small freq feedings. Davis also restricts all food and fluids by mouth. hundred and fifty cc. of 5 per cent glucose solution contain 30 to 60 grains of sodium bromide and sodium bicarbonate given by rectum every four to six hours, gradually decreasing bromides. After twenty-four to thirty-six hours, feeding by mo is resumed, small quantities of liquids at first and later solid fo With dehydration, hypodermoclysis of 800 to 1000 cc. of phy logic salt solution, or glucose intravenously, supplements the re therapy.

De Lee also advocates rectal feeding and therapy. He gi 1 dram of sodium bromide in 4 ounces of milk every four hours rectum, for 8 to 10 doses. He states that the use of corpus lute in this condition is disappointing.

The foods used should be dry, such as toast, a chop, sliced chick or crackers with jelly or marmalade. Hyperemesis is at tim relieved by the use of whole wheat bread whereas food lacking vit min B_1, as white bread, sugar, or potatoes, may be ineffecti Water must not be taken until one and a half hours after eatin and not within one hour of the next feeding. If a dry diet is rejecte liquids in a semi-solid form should be tried and, if they fail, duoden feeding may be instituted. Insulin with a high-carbohydrate di has been used with some satisfying results.

Water and salt must be introduced into the system to replac that lost by vomiting. Sugar must also be supplied to replace th depleted glycogen. This should be given intravenously in the form of hypertonic glucose solution. Two hundred cc. of a 25 per cen glucose solution may be given twice daily with safety if the necessit presents.

In some instances the hypodermic use of large doses of atropin sulphate on awakening or at frequent intervals has proved advan tageous.

Underweight in Pregnancy.—Discussion.—A woman may be con sidered as being underweight when the standard of average siz to weight ratio is decreased by 10 to 15 pounds. Underweight i divided into two types, the sthenic and asthenic.

In the sthenic or hereditary type the patient has good stamin and normal resistance to disease. While she may be below th average normal weight, she is vigorous and well able to tolerat pregnancy with little or no difficulty.

The asthenic patient is not only thin, but undernourished, an lacks resistance and endurance, due to an abnormal metabolism o an actual diseased state which has a defective metabolic rate as a concomitant or as a sequence. The latter group is prone to abor tion, premature delivery, prolonged labor, postpartum hemorrhage postpartum sepsis or other complications of pregnancy.

the dietary management of these patients, refer to Under-
.

sity in Pregnancy. Discussion. Obesity can be said to exen the standard of average size to weight ratio is increased by cent or more. In pregnant women allowance must be made e gestation sac and consideration given to the growing fetus ermining the existence of obesity. Irrespective of the underause of obesity, whenever the amount of energy produced by dy economy is less than that represented by the food intake, ularly if combined with little or no physical exercise, obesity . Moderate and regular exercise aids metabolism, and sup- muscle tone. Lack of exercise results in flabbiness, with all

LOW-CALORIC DIET.
(Approximately 1200 Calories.)

Typical Menu.

ing or midmorning:	
e tablespoon brewer's yeast powder in	
e-half glass water or fruit juice	
:fast:	
sh fruit	*one serving*
ole grain bread *or* toast thinly buttered	*one slice*
lk	*one cup*
norning or midafternoon:	
uit juice	*one cup*
liver oil capsules	*two*
heon:	
ttage cheese	*one-quarter pound*
or	
ggs	*two*
oked vegetable, other than potato	*one serving*
arge salad of raw vegetables	
hole grain bread thinly buttered	*one slice*
esh fruit	*one serving*
ilk	*one cup*
ner:	
ean meat *or* fish (no gravy)	*one-quarter pound*
oked vegetable, other than potato	*one serving*
arge salad of raw vegetables	
hole grain bread thinly buttered	*one slice*
resh fruit	*one serving*
ilk	*one cup*
time:	
ilk *or* buttermilk	*one cup*

isadvantages. Most cases encountered in practice are the vics of an unrestrained and excessive appetite. Paralleling this rvation is the generally accepted fact that the pregnant woman ften troubled with a voracious or perverted appetite. While may be of mental origin, it is nevertheless reflected physically

in size and weight, because of her satisfaction of the abnorm petite.

The diet need not consist of any specially prepared dishes, n it necessary to resort to freak menus or manufactured foods. ordinary diet suitable for pregnancy should be adhered to. E of fats, sugars, sweets and pastry must be avoided, and their i tion even curtailed. This will have favorable influence in pre ing obesity in the average case, and will benefit those patien whom the tendency to excessive weight is apparent, or obesi already present. The protein, mineral, and vitamin content of diet must be maintained at all times and not allowed to fall b the sustaining level. Except under close supervision the diet obese pregnant women should furnish not less than 1200 Calo

Eclampsia.—Discussion.—The etiologic factors in eclampsia still somewhat obscure, and until the causes are proved, the restrictions must be predicated on the results of recent investi tions and conceptions of the condition. Eclampsia has been ca the disease of theories. The theory that eclampsia is of nephr origin has been almost discarded and the associated nephritis usu ly present is now regarded as secondary rather than as the excit cause. The diet should, therefore, conform to a proper concepti of the underlying metabolic derangement and be modified somew by the patient's condition in the pre-eclamptic, eclamptic or po eclamptic state. If complications are present the diet must be mo ified still further. Proper restriction and regulation of food duri pregnancy is excellent insurance against the development of eclam sia.

Pre-eclamptic State.—In the pre-eclamptic state the usual pr cedures should be rigidly enforced. These include restriction protein intake, absolute rest, due attention to bowel and kidn elimination. In view of the incidental disturbance in carbohydra metabolism, as demonstrated by Titus, the ingestion of carboh drates should be markedly increased. Intravenous injection glucose is usually unnecessary in these patients, as they can ta and retain food by mouth. A diet high in carbohydrates is essenti in pre-eclamptic patients and glucose with fruit juices should prominent in the prescribed diet.

If toxemia becomes severe and the kidneys are involved, even a minor degree, the patient should be put to bed and allowe nothing but water or milk by mouth. As the symptoms abate, a absolute milk diet is given, which is later augmented by the gradu addition of cereals, vegetables, vegetable oils and butter. Still lat if the patient is progressing favorably, a full vegetable diet wit fruits and 1 egg daily is permissible. Fish, chicken, smoked fresh ham is finally added, but a full diet is contraindicated. Spice tea, coffee, alcohol, and meats in general are forbidden. The heav est meal should be given at noon. Water is indicated in larg amounts at room temperature, unless contraindicated by a com plicating edema or cardiac involvement and should be taken o an empty stomach, morning and night. Peptonized milk, koumis

uttermilk are excellent aids in expediting convalescence. All e emunctories should be stimulated by alternating saline and able cathartics.

lamptic Stage.—The most important item in the treatment of eclampsia is the intravenous administration of hypertonic glu- solution in single doses of 75 grams in 300 cc. of water (25 per solution). This should be given at the rate of not more than am per minute, taking from one and a quarter to one and a hours for the entire injection. The injection should be repeated intervals of four or five hours during the attack and even the cessation of the convulsions (three or four times in the twenty-four hours). Further injections depend upon the needs response of the patient, but should be continued until fluids be taken freely by mouth.

fter recovery from the acute attack, the pre-eclamptic diet can restored and maintained until delivery takes place. The diet be varied somewhat if conditions are especially favorable, in r to avoid monotony.

t must be remembered that diet alone rarely cures eclampsia. licinal therapy where indicated is essential; even emptying the rus may be necessary.

nemias in Pregnancy.—Discussion.—It has been reported that mean hemoglobin concentration in pregnancy is 11.56 grams per cc. of blood; the mean cell volume, 37.31 volumes per cent; and mean erythrocyte count, 3,770,000 per c.mm. The minimal ndards for normal pregnancy may be placed at:

Hemoglobin	10 grams per 100 cc.
Cell volume	33 vol. per cent
Red blood cells	3,360,000 per c.mm.

Various forms of anemia have been described. The mild type ally is due to a deficiency in calcium, iron, copper, and manga- se. A second type is insidious in onset and is generally associated h vomiting or other gastro-intestinal disturbance. In such cases, re has been long-standing dietary deficiency with regard to pro- n foods, fruits and green vegetables. The blood picture shows pochromia. The most severe type is due to deficiency of Castle's rinsic factor in the diet or lack the intrinsic hematinic principle the stomach and intestines. Much variation is seen in the shape l size of the erythrocytes; megalocytes are always present. The or index is about 1. When the protein intake is adequate, the noglobin content of the blood will usually be normal.

The first essential in the treatment of any anemia is to determine type whether macrocytic, normocytic or hypochromic macrocytic. e anemias of pregnancy are usually attributable to dietary de- ency together with defective utilization of iron. The hemoglobin ches its lowest level near the seventh month. Therapy should be tituted if it falls below 11 grams per 100 cc. It is advisable that emoglobin determination be routinely at this time. Iron in cer-

tain protein foods is less readily available than that in carbohydr rich foods. Refer elsewhere for discussion of utilizable iron.

During the latter half of pregnancy, liver should be an inte part of the diet. Medicinal iron also is advisable. Blood tran sions may be resorted to without deleterious effects. Treatmen anemia in pregnancy differs in no respect from the usual thera In pregnancy the prevention of anemia is easier than the cure. adequate diet, with proper hygiene, is probably the best prophyla

Following Obstetrical Operations.—**Discussion.**—The diet foll ing operative obstetrical procedures differs in no respect from t suitable for the post-operative gynecological patient. Follow Cesarean section, which is usually attended with considerable l of body fluid as well as blood, it is wise to force fluids as early possible by all available avenues. The diet must be high in calo value to restore the normal physical equilibrium of the patient a prepare her for the period of lactation. A slightly higher carb hydrate and lowered fat ratio will tend to offset the common associated post-operative acidosis.

Following Postpartum Hemorrhage.—**Discussion.**—Postpartu bleeding may occur during the third stage of labor or during t first twenty-four hours thereafter. The bleeding may be check by immediate treatment, but blood transfusion is often necessar Subsequently, the diet should be planned to renew vital energy an to aid in the restoration of the strength of the patient.

Labor.—**Discussion.**—The labor of childbirth is equivalent to on half hour of heavy bodily work or three hours of light work.

Experience at the Chicago Lying-In Hospital has led Adair t the adoption of the following suggestions relative to the food an fluid intake of pregnant patients. No fluids or solids of any descrip tion should be given to patients in labor, when the delivery is an ticipated within two hours, and for patients in whom short labor i anticipated nothing except water or fluid without residue should b given during labor. When fluids are administered they should b used in quantities not to exceed two ounces and should not be re peated more frequently than every thirty minutes. In protracte labor, fruit juices, sweetened with sugar plus additional lactose ar given.

The Puerperium.—**Discussion.**—The dietary during the puer perium should not be different from that of the post-operative non febrile patient, except that it can be more abundant and varied Fluids should be given freely for the reason that during labor an subsequently the body is drained of a considerable amount of flui and blood, and this loss must be restored.

If a general anesthetic has been given there is usually some sub sequent nausea and vomiting. As soon as these have subsided a cup of hot tea is gratifying. Water at room temperature may be give in small quantities at regular intervals.

On the first day of the puerperium small quantities of easily digested foods such as bouillon, boiled or poached eggs, buttere toast, milk, milk toast, buttermilk, Zoolak, gruels, fruit juices, jellie

coffee, tea or cocoa may be given at frequent intervals. Water be given between feedings.

the second day simple soups, strained cereals, vegetables or raw or stewed oysters, sweetbreads, chicken and junket can en in addition to the diet suggested for the first day.

the third day, after the bowels have functioned, the patient turn to her normal diet.

old principle of enforcing the recumbent position during the eral period is not in accord with modern obstetric practice, as ambulation even of first or second day postpartum tends to e muscle tone, involution, promotes circulation, and facilitates age from the uterus. This dictum is diametrically opposed to ormer view that the supine posture and immobility were of importance in favoring uterine involution and preventing ne "displacements."

ctation.—Discussion.—Nutrition in the postnatal period is important not only for the mother and infant but in the restoration of les, bones, fibroligamentous structures and the uterus. The of the nursing mother must be sufficient in caloric value to ly her own needs and those of her infant and in addition should ide sufficient reserve in case of emergency. Dietary studies e upon women during lactation indicated that whenever the er's diet fell below a certain minimum, the milk was affected nsequence, either in quality or quantity, particularly the latter. of paramount importance that the forcing of fluids be constantly ted upon.

the amount of protein intake is reduced, a marked reduction in quantity of milk results almost immediately. Eighty-five grams preferable 120 grams daily is advised. Restricted carbohydrates uced very little change, if any, in either the quantity or quality e milk until they fall below 50 percent of the total calories ind, at which time there is a rapid drop in the amount of milk ted. Reduction of fat content has no effect upon the secretion ilk, either directly or indirectly, until a minimum of approximatee gram per kilogram of body weight is reached; then both the tity as well as the fat content of the milk will be lessened. Minash has little if any effect on the quantity, but it does alter the ity of the milk. The quantity and richness of the milk theredepend chiefly on the protein content.

e conversion of food protein into milk protein by the secretory anism of the woman is only about 50 to 60 per cent efficient. necessary, therefore, to supply an additional amount of food ein, approximately 2 grams for every gram of milk protein eted; *e. g.*, a woman secreting 800 to 900 grams of milk daily ld supplement 20 to 25 grams of protein daily, supplied by , eggs and milk products.

e vitamin content of the milk depends upon the amount of e substances furnished by the diet because the body does not rate vitamins. During lactation the drain on calcium and phorus often is severe. The need for calcium is easily supplied

by the ingestion of $1\frac{1}{2}$ quarts of milk a day. In multiparæ, rapidly succeeding pregnancies, there is a tendency to poor r tion of calcium and phosphorus, regardless of the intake adequate vitamin D is furnished. It has been claimed by many the demand for vitamin C is greater during pregnancy and lact

Infant's Daily Fuel Requirements During Nursing Period.

Months.	*Calories per po*
Up to 3	60
3 to 6	50
6 to 9	45
9 to 12	40

Fuel Requirement of Nursing Mother.

For mother	2400 Calories
For infant of 12 pounds	600 Calories
Plus energy lost in converting food into mother's milk	60 Calories
	3060 Calories

than in the non-pregnant woman. This vitamin is derived from fr fruit, particularly oranges, lemons and limes, tomatoes, fresh canned. Vitamin A is likewise essential. It is available in crea butter and fish-liver oils. Of the mineral elements, calcium is tained from milk and vegetables; phosphorus from milk and eg iron from lean meats, eggs, fruits and vegetables. Refer elsewh for vitamin requirements during lactation.

Typical Menu for the Lactation Period.

Morning or midmorning:

One tablespoon brewer's yeast powder in one-half glass of milk

Breakfast:

Fresh fruit
Cooked whole grain cereal with milk and sugar
Egg
Whole grain toast *or* roll with butter
Milk *or* hot milk flavored with coffee and sugar

Midmorning or midafternoon:

Buttermilk, milk *or* eggnog

Luncheon:

Cream of vegetable soup
Eggs *or* cheese
Cooked vegetable
Raw vegetable salad with dressing
Whole grain bread with butter
Stewed fruit
Milk

Typical Menu.—(*Continued.*)

r:
it *or* fish
ato
ked vegetable
id with dressing
ole grain bread with butter
ple dessert, fruit *or* cheese and crackers
lk
me:
lk *or* cocoa with graham crackers

e elimination of nicotine by lactating breasts confirmed by bio-
il tests has been demonstrated.

hat deleterious effect, if any, this has on the infant is still sub-
to further investigation. It would therefore be advisable to
il smoking during the nursing period to prevent any possible
fects on the baby due to absorption by the nursing infant.

lvic Inflammatory Diseases.—**Discussion.**—Clinical and labora-
investigations have demonstrated that an elevation of 1° C.
dy temperature causes an average increase of 13 per cent in
metabolic rate. The old doctrine of "starving a fever" is
amentally erroneous. The total energy required at such a
is always greater than in health; the higher the temperature,
greater the need for food. A diet which does not furnish enough
gy to provide heat production sufficient for the needs of the
ent forces her to live at the expense of her own tissues.

atients with fever can usually take the amount of food they
iire without detriment and whenever possible 3000 to 4000
ories a day should be given. The carbohydrates will contribute
tly to the maintenance of the energy value of the diet. If they
not well tolerated or easily digested, the quantity of the fats may
gradually increased. The vitamin intake should be augmented
apeutically if necessary. Refer to section on Vitamins.

ourishment should be given in small quantities at frequent
rvals. It must be served in a palatable form after careful selec-
, and wherever possible in accordance with the patient's desires.
Iilk may be used in abundance but should not be relied upon as
sole article of diet. The foods most useful are milk, cream, eggs,
d or toast, crackers, well-cooked and bran-free cereals, rice, well-
ked potatoes, butter, milk sugar, bacon, cane sugar, tea, coffee,
oa, apple sauce, strained fruits, cereals and vegetables, orange
e, lemonade and grape juice. Meats may be allowed, in small
ntities, once daily, and preferably at midday.

efer to Febrile Conditions for appropriate diets.

eukoplakia:—**Definition.**—Chronic atrophic inflammatory con-
on affecting either the entire vulva or a small area thereof char-
rized by the formation of whitish plaques of thickened epidermis,
sclerosis of the subjacent connective tissue and absence of
tic fibers producing a parchment-like consistence of the affected

skin. (Taussig) Wolbach and Howe have demonstrated that in continued absence of vitamin A, from the diet the most prominent changes following this deficiency is a transition in which the normal epithelium in various parts of the body is replaced by keratinized epithelium. In 1922 Evans and Bishop found a persisting cornification of epithelial cells present in the vaginal smears of rats which had been oophorectomized previously during a diet test in which vitamin A was pathologically deficient or entirely absent. Relief and even cure of keratosis follicularis (Darier's Disease) ichthyosis and other types of keratotic skin conditions are frequently reported in the literature. This would serve to indicate the basis for the treatment of Leukoplakia Vulvae with vitamin A.

Clinical studies in other fields have demonstrated the relationship existing between HCl deficiency of the gastric contents and the low plasma level of vitamin A. Premature infants have little or no free HCl in the stomach with a concomitant low plasma of vitamin A and improvement takes place after the administration of lactic acid milk. In certain diseases of adult life such as carcinoma of the stomach, or pernicious anemia, the plasma level of vitamin A may be very low and in some cases the vitamin is entirely absent.

Leukoplakia patients appear to have either a deficiency of vitamin A in the foods as taken orally or some interference with its absorption after ingestion. With this thought in mind the author recently published a method for the relief and possible cure of leukoplakia of the vulva. The schedule of treatment is as follows:

1. A diet rich in vitamin A (See list of foods rich in vitamin A)
2. Intramuscular injection of 250,000—500,000 Units of Vit. A biweekly
3. Oral administration of 100,000-200,000 Units of Vit. A daily in divided doses
4. Fifteen drops of dilute HCl in water three times daily

The results have been encouraging, warranting further study of the relation between vitamin A deficiency and Leukoplakia.

Pre-operative Diet for Gynecological Patients.—**Discussion.**—The pre-operative preparation of the gynecological patient, except in special instances, differs in no way from that of any candidate for abdominal surgery.

Gynecological operations are usually elective and there is ample time for proper preparation. It has been well said that the best pre-operative preparation is "a pitcher of water and a box of candy!" Extra salt should also be provided. The patient's normal habits should be respected and the reserve of physical strength fortified. The increased ingestion of fluids should be started three days before admission to the hospital and should continue to within three hours of operation, to compensate for the loss of body fluid incidental to anesthesia and possible loss of blood during a protracted operation. Depletion of the tissues can be avoided by the use of gentle laxatives and enemas. The use of morphine and atropine sulphate should be restricted so far as practicable, and many gynecologists are now advocating some of the more recently available sedative preparations as substitutes.

Consideration should be given to the patient's diet several days advance. The customary food intake should be supplemented carbohydrates. Special attention should also be given to the prevention of constipation and the formation of gas. In the asthenic, undernourished and highly neurotic patient, a high-calorie diet indicated. In the obese there should be no attempt to reduce weight rapidly; a sustaining diet, with cautious stimulation of the emunctories and cleansing of the gastro-intestinal tract with enemas is desirable.

The normal stomach is empty of all food four to six hours after ingestion, and there is no necessity for unduly withholding food for a longer period prior to operation. If the operation is scheduled for the morning, a regular supper may be given; if for the early afternoon, a light breakfast is permissible. These principles apply to all abdominal or vaginal operations and conditions unattended by complications or fever. When fever is due to remote abnormal conditions, the diet appropriate for febrile disorders should be followed.

The ingestion of salt pre-operatively will lead to increased tissue retention of fluids which in turn will obviate the administration of additional fluids post-operatively.

The following diet is suggested for use on the day previous to operation:

Typical Menu.

Breakfast:
- Glass of orange juice (chilled)
- Oatmeal with skim milk and 2 teaspoonfuls of sugar
- Hot biscuits with limited butter and honey
- Cocoa

Luncheon:
- Poached egg in center of mashed potato without butter
- Lima beans (not buttered)
- Average size lettuce salad with Thousand Island dressing
- Tapioca pudding with fruit sauce
- Hot rolls with limited butter
- Milk, buttermilk or malted milk

Dinner:
- Fruit cup
- Broiled lean fish with lemon
- Potato salad on lettuce with French dressing
- Creamed corn
- Toast, limited butter
- Ice-cream or water ice, fruit flavor
- Milk

NOTE.—The patient should be urged to take water liberally throughout the twenty-four hours preceding operation.

Post-operative Diet for Gynecological Patients.—Discussion. The post-operative dietary regulation for the gynecological patient is

primarily dependent upon her general condition, the type and duration of operation performed and the state of the stomach after recovery from anesthesia.

If the patient has been prepared in accordance with the principles outlined under pre-operative preparation, her condition is usually good, and in uncomplicated cases the early allowance of food tends to stimulate peristalsis and thus serve as a prophylactic in the development of paralytic ileus. The feeding problem is to meet existing conditions, compensate rapidly for the loss of body fluids and give a diet not only suitable but also acceptable to the patient. Articles of food likely to cause fermentation, with subsequent flatulence and distention, should be shunned. Refer to Flatulence Producing Foods.

The administration of foods high in caloric value is desirable, so that extra nutrition is provided and thus expedites convalescence. Protein, carbohydrates, fats, fluids and salts must be judiciously combined. The rapidity of increase in the daily menu depends upon the well-being of the patient, but an endeavor should be made to resume a regular diet in the shortest time compatible with gastro-intestinal tolerance. Fluids should be given and increased as early as possible.

Regional, spinal and local anesthesia produce less gastro-intestinal disturbance than general anesthesia. Hence, fluids and nutriment can be given earlier and increased more rapidly than after inhalation anesthesia.

There are many who adhere to a routine as follows, in cases where a general anesthetic has been given:

First Day.—No food is necessary other than small quantities of water at short intervals. Hot tea and mouth rinsing with lemon or orange juice and glycerin or sweetened water are useful.

Second Day.—Broth, tea, saltines, toast, Zwieback, custard, gelatin preparations, junket.

Third Day.—Soft diet. Refer to page 185.

Fourth Day.—Regular diet.

Following the use of **regional or spinal anesthesia**, the withholding of food is unnecessary.

First Day.—Fluids are given at short intervals, especially hot tea or coffee with sugar. A semi-soft diet may be immediately instituted. Refer to Fluid Foods and Soft Foods.

Second Day.—The patient may be given a soft or regular diet, depending on the operation performed and her general condition.

Sufficient time and extended experience has proven the value of early ambulation following gynecological operations. Instead of the protracted, gradual restoration to normalcy following the usual period of bed rest post-operatively, there is a rapid return to normal physical condition without the usual drawbacks of the older method. This in itself is proof sufficient that early ambulation is in accord with our present knowledge of the after effects of surgical operations and their alleviation. Withholding of food postoperatively longer than is necessary is detrimental to the rapid recovery of the patient.

od in proper amount and quality is paramount in facilitating the ution to health. Each case must be treated according to cons present in the individual patient and the type of operation rmed. It is therefore advisable to administer a normal diet as as possible, even in the first postoperative day irrespective of type of anesthesia used, unless contraindications make this imible.

onstipation is a troublesome complication frequently encound in the post-operative patient. Manipulation of the gastrostinal tract followed by confinement to bed tends to promote is of the colon and difficulty in evacuation. It is, therefore, essary that the regular diet contain sufficient roughage and the owing foods are suggested to be included in the daily menu: fy vegetables, such as lettuce, spinach, cabbage, cauliflower, aragus, tomatoes, onions and legumes. Fruits, such as apples, rs, oranges and grapes. Figs, raisins and prunes served either or cooked. Honey and preserved fruits. Fats, such as bacon, am, butter and oil dressings. Whole wheat bread. Bran. Milk. rther dietary details are to be found under Atonic Constipation.

Since most gynecological operations are confined to the pelvis d often involve the urinary bladder, it is wise to catheterize the tient at eight-hour intervals for the first three days and once ily for three days after the patient has voided. This prevents cumulation of residual urine and overdistention of the bladder. inary antiseptics, such as hexamethylenamin and acid sodium osphate, are given with an abundance of water. These measures e particularly indicated and necessary after hysterectomy and astic repair operations on the anterior vaginal wall.

HAY FEVER.

Refer to page 220.

HEMOPHILIA.

Discussion.—It is debatable whether diet has any influence on mophilia. As a rule, serum calcium is normal in hemophilia though calcium deficiency has been reported on rare occasions. asmuch as the diet of the average individual is so frequently adequate with reference to calcium, it is suggested that high lcium intake be instituted until a more rational dietetic regimen n be devised.

Those foods which, upon analyses, yield a high-calcium perntage follow:

lmonds, filberts, hazel nuts, walnuts.

heese, milk, skim milk, malted milk, buttermilk, eggs, egg-yolks, dried milks, evaporated milks, condensed milk, goat's milk, ice-cream.

itron, oranges, pineapples, figs, pears, cherries, olives, strawberries, gooseberries, currants, huckleberries.

ocoa, molasses, gelatin, maple syrup.

atmeal, cornmeal, wheat flour, Boston brown bread.

Oysters, clams, salmon, pickerel.
Pork (fresh or smoked), bacon.
Savoy cabbage, cauliflower, onions, lettuce, radishes, celery, c
bage, cabbage greens, endives, spinach, asparagus, carrots, k
rabi, turnips, rhubarb, artichokes, pumpkin, lentils, cucum
tomatoes, beans, turnip tops, Swiss chard, broccoli, dand
greens, endive.
Milk and milk preparations, egg-yolk, eggs and cheese are accept
being the highest calcium-bearing edible items available.

Typical Menu.

Breakfast:
Fruit
Whole grain cereal with milk and sugar
Egg
Whole grain toast *or* rolls with butter
Milk *or* hot milk flavored with coffee and sugar

Luncheon:
Cream of vegetable soup
Eggs *or* cheese
Cooked vegetables
Salad with dressing
Whole grain bread with butter
Fresh or stewed fruit
Milk *or* cocoa

Dinner:
Meat *or* fish
Cooked vegetables
Salad with dressing
Whole grain bread with butter
Simple dessert *or* cheese and crackers
Milk *or* coffee with cream and sugar

HEMORRHAGE, GASTRIC.

Clarence Fuller, M. D.

The dietary procedure in gastric hemorrhage from causes oth
than ulcer for the first twenty-four to forth-eight hours is not su
ject to much controversy. It consists in withholding all foo
whether fluid or solid. In cases of good nutrition and where c
operation is obtained, the sucking of cracked ice and the e
pectoration of the fluid accumulated in the mouth can frequent
allay the associated thirst. The chewing of gum may accompli
the same purpose.

Commonly, due to dehydration, artificial means of supplying flu
to the body and combatting shock may have to be instituted. The
measures may be parenteral administration of glucose and saline b
hypodermoclysis or infusion; transfusion; and intravenous plasm

HEPATITIS.

Refer to page 441.

HEMORRHOIDS.

Refer to page 503.

HIRSCHSPRUNG'S DISEASE.

VINCENT LARKIN, M.D.

cussion.—Hirschsprung's disease is a form of habitual constipa- in young children caused by enormous congenital hypertrophy lilatation of the lower portion of the colon. At times, the increases in length.

nstipation is the earliest symptom and may be present from . Spontaneous evacuation of the bowel is rare. It is not infre- t for evacuation to occur no more than once a week, and cases been reported where it took place only once a month. The fecal mulations attain great size and at times acquire a stone-like istency. Their passage is so difficult that it splits the anal g. and the child in fear of pain repels all desire for defecation. ciated with this persistent constipation is abdominal distention, h may be found as early as a day or two after birth, or it may lelayed for weeks or months.

f recent years, surgical treatment has been tried but has resulted mortality rate of 40 to 50 per cent.

herever possible, conservative dietetic treatment is indicated must be aimed at complete digestion of food, so that the entero- s will be small. Infants should be nursed as long as possible; for older children the usual methods of treating constipation are ommended. In addition, foods which stimulate peristalsis other n by their bulk should be given. Buckstein has recommended iet in which there is "A restriction of animal protein and a diet h in residue." This is exactly the opposite of what the author s is the normal diet for these cases. The food must be non- stipating, leave no residue and no bulk. Foods with high min B value are somewhat laxative, and, therefore, should be rporated into the diet. (Refer to "Smooth" Diet for Constipa- , and Foods Rich in Vitamin B.)

uggestions.—When correctly employed, massage is helpful and uld be administered for five or ten minutes after retiring and ore rising. A fair amount of general muscular exercise is necessary should be made a part of the treatment in every case. Special rcises for the development of the abdominal muscles should be hfully carried out.

atharties are contraindicated, but various types of enemata, cially, oil enemata, have proved efficacious in many instances. per posture during evacuation is of some importance; a low seat nursery chair or chamber is better than a high one.

HYPERACIDITY, GASTRIC.

CLARENCE FULLER, M.D.

iscussion.—Gastric hyperacidity is due to an excess of free rochloric acid in the gastric juice. It is probably true that over

one-half of the patients who consult physicians because of ga
troubles have this condition. The cause which is responsible
the excessive acidity should be the guide in selecting a diet. W
the cause is undetermined, the following principles should be
served:

Avoid foods which act as a stimulant to the glands of the stoma
as acids, spices, coffee, tea, condiments, alcohol and foods extrem
hot or cold; administer fats (cream, sweet butter, etc.) to dimin
gastric secretion; prohibit smoking and the chewing of tobacco.

In brief, the diet should be of a bland nature, incapable of p
ducing further increase of hydrochloric acid and capable of reduci
the already present superacidity.

The foods allowed are milk, cream, sweet butter, eggs, fine cerea
toast, baked potatoes, rice, macaroni, spaghetti, arrowroot, tapio
and cornstarch.

The leafy vegetables, from clinical experience, have proved som
what acid-producing in the stomach and for this reason shou
be avoided wherever possible.

Omit.

- Alcohol
- Bouillon
- Broths, clam, beef, mutton or chicken
- Carbonated beverages
- Coffee and coffee substitutes
- Condiments
- Excessively cold foods
- Excessively hot foods
- Fruit juices
- High-acid foods, such as citrus products, etc.
- Highly seasoned foods
- Leafy vegetables
- Meats in general, meat extract meat jellies
- Raw fruits
- Salad dressings
- Spiced, smoked, salted, brine pickled and corned foods (ex cept ham and bacon)
- Tea
- Tomatoes
- Vegetable juices

Typical Menu.

Breakfast:

Stewed fruit
Cereal with cream and sugar
Toast *or* rolls with butter
Milk *or* hot milk flavored with coffee and sugar

Luncheon:

Cream of vegetable soup
Choice: potato, macaroni, noodles, rice, spaghetti, vermicelli wit butter
Choice: eggs, cottage *or* cream cheese
Bread with butter
Stewed fruit
Milk

Typical Menu.—(*Continued.*)

...er:
...all serving white fish, bacon *or* chicken
...tato
...oked vegetable, other than leafy
...ead with butter
...mple dessert
...ilk

...ggestions.—It must be borne in mind that clinically it is often ...ssible to differentiate the symptoms caused by other agents ...h do not respond to alkali therapy. Gastric analyses occasion... reveal hypochlorhydria when the presenting symptoms suggest ... hyperchlorhydria. In gall-bladder disease, low normal find... or hypoacidity is more frequently encountered than hyper...lity.

...t has been ably demonstrated that protein, upon ingestion, ...bines with the hydrochloric acid of the stomach. Hence, theo...ically, it seems indicated to advocate a high-protein diet for a ...ient suffering from hyperchlorhydria. The recognized foods ...h in protein are egg-white, gelatin, cheese, fish and meat. Clinic...y, it has been found that the recommendation of these foods in a ...t for hyperchlorhydria is impractical and does not alleviate the ...mplained-of symptoms of the patient. It is barely possible that ...e interpretation of the discrepancy between the theoretical and ...nical proposals is due to the fact that meat and fish are received ...to the stomach in a physical condition such as to render the protein ...attackable by the already excessive amount of hydrochloric acid. ...e previously noted menu has limited amounts of protein in the ...rm of meat and fish.

From a practical and clinical standpoint it has been found that, ... all the meats, smoked ham is best tolerated in the presence of ... "acid stomach." Reference can be made to Bland Foods, Conva...scent Ulcer Diet and Alcoholism for further diet suggestions.

HYPERCHOLESTEREMIA.

Refer to page 384.

HYPERTENSION—ESSENTIAL

In this very common disease an elevated blood pressure exists ...thout any accompanying anatomic or functional pathology. All ...ch changes that occur seem to be secondary to the blood pressure, ...d not the cause of it. Under these circumstances, it becomes ...cessary to devote a good deal of attention to the diet. There are ...any traditions concerning the influence of proteins, especially those ...rived from red meats, on blood pressure. These have been proved ... rest on hearsay only and it is now found that proteins may be ...ven with impunity to hypertensive individuals without causing a ...e in the arterial tension. This is true for short periods of feeding

(Mosenthal, and Strouse and Kelman), as well as for prolonge restricted high-protein diets (Lieb). It is very interesting to n this connection that a large group of persons like the Gree Eskimos can live on a purely carnivorous diet without exhibiting increased tendency toward vascular hypertensive or renal di (Thomas).

An important point in the dietetic management of cases of hy tensives that are overweight is the restriction of the fats and carb drates. These foods are the principal reason for the developme obesity, which is more to be dreaded than any other effect of die this disease. The patient who is overweight puts an enorm burden on the heart which can be readily avoided if the ave weight, or less, is maintained. In other words, an anti-obesity will not increase blood pressure and thus will not be harmful. On other hand, it will render the patient less vulnerable to the inro and the hazards of hypertension.

The question of fluids has frequently been discussed with the i that an increased blood volume will have a tendency to raise arterial tension. By practical experience it has been demonstra that fluids taken in amounts up to 6 quarts a day do not influe the blood pressure (Orr and Innes). Since the usual fluid intake day is about $1\frac{1}{2}$ to 2 quarts, there is probably nothing to be gai by limiting or restricting the amounts of fluid in the diet.

The restriction of sodium chloride has been advocated as a mea of controlling a high blood pressure. Allen and Sherrill have pu lished extensive observations on this subject. They found that sa free diet reduced the blood pressure as well as the symptoms for whi it was responsible. This is especially true of the palpitation, dyspne angina pectoris, edema and anasarca. The beneficial effect of r moving as much salt as possible from the diet in order to check th cardiac symptoms has been a common experience, and it is believ that restriction of sodium chloride in the food is very much indicat in the treatment of hypertension.

In summary, it may be stated that a diet should be aimed at whi maintains the patient at a normal weight, that is, does not contain excess of carbohydrate or fat, contains sufficient protein to mainta the hemoglobin and red cells at a normal level but not above it, a allows the usual amount of fluids customary in the average di While coffee, tea, and other condiments are not prohibited, t patient should be cautioned against their excessive use.

Rice and Fruit Diet for Hypertension.—Walter Kempner has a vocated a dietary treatment for hypertensive states which may may not be associated with demonstrable nephritis. This diet co tains no animal protein and is limited to rice, fruit and fruit juic with vitamin and iron supplements. The objective evidence of in provement which he reports is a significant drop in blood pressur a decrease in the size of the heart, a lowering of nitrogen and cholest ol blood levels, an improvement in electrocardiographic abnorma ties and an improvement in the changes of the retinal arteries.

Diet Recommended by Kempner

2000 calories

60 gms. P 20 gms. F 5 gms. Sodium 0.2 gms.

Fluid intake restricted to 1000 cc (fruit juice)

— 8 to 10 oz. (dry ordinary rice) cooked without salt or milk, e steamed in fruit juice or plain water.

it—Fresh or preserved (except nuts, dates, avocados). fruit juices permitted except tomato juice.

ar—Brown or white as desired.

l rice slowly to boiling water and boil for twenty minutes, through a colander, wash with hot water. If wet rice is pre- l omit washing with hot water. Rice can then be steamed for fifteen minutes. Serve with fruit or fruit juice.

er satisfactory improvement has been noted patient may add eguminous vegetables, lean meat, chicken or fish, eggs. No r fat.

is well to supplement the diet with a general vitamin prepara- and with iron tablets.

HYPOACIDITY, GASTRIC.

Clarence Fuller, M. D.

iscussion.—Gastric hypoacidity is a condition in which there n absence or deficiency of hydrochloric acid in the gastric e. There may be a slight reduction in, or a complete absence his secretion. Subtotal acidity and achylia gastrica are frequently ciated with certain types of gastritis, gastric carcinoma, secon- and pernicious anemia, influenza and severe infectious diseases. nmonly, it is encountered among elderly people with no demon- ble etiology.

is well recognized that gastric hypoacidity is generally but a ptom of some underlying disease. Hence, the prescription of a is purely symptomatic and will tend toward the alleviation of complained-of symptoms on the part of the patient, but in vise will correct the etiology. The suggestions are:

. Give broths, meat extracts and stock soups as stimulants to the ric secretion. These foods should be served as attractively as sible to stimulate not only the physical gastric secretion but the mental desire for food.

. Increase the protein content of the food but give only those ls which are most easily digested. In this way the patient is ne to receive a sufficient daily allowance of protein consistent with establishment of a proper nutritional maintenance. As noted where, average protein consumption is only 45 to 55 grams *per*. An increase over this amount can and should readily be omplished.

. Fats should be given in moderate quantities. The excessive of fats tends to increase the fatty acid content and *per se* may to gastric symptoms.

4. Carbohydrates should be given in moderation, especially starches. As a rule, salivary digestion in these cases will cont longer than normal.

5. Particular care should be taken against bacterial food taminants, as the natural germicidal action of hydrochloric ac missing.

6. The ingestion of coffee, coffee substitutes and tea is hear recommended, owing to their ability to excite hydrochloric a providing insomnia or other untoward complications do not p clude their use.

7. Meats are recommended. Pickles, anchovies and other sal foods are also approved, if not otherwise contraindicated.

8. In the author's experience the leafy vegetables, which ess tially constitute the 3 per cent carbohydrate list, tend to ex excessive gastric hyperacidity and for this reason should be utiliz

Omit.

- Food high in starch such as: Alimentary pastes, rice, sago a potato; puréed tubers
- Milk and milk products other than highly fermented chees ice-cream, custards and puddings
- Stewed fruits
- Cereals of the cooked variety

Typical Menu.

Breakfast:
- Fruit juice
- Bacon, ham, chipped beef or salt fish
- Toast with butter
- Coffee with cream and sugar

Luncheon:
- Bouillon
- Lean meat *or* fish
- 2 cooked vegetables other than potatoes
- Salad with dressing
- Bread with butter
- Fresh fruit *or* cheese with crackers
- Tea with lemon

Dinner:
- Vegetable soup *or* consommé
- Lean meat *or* fish
- 2 cooked vegetables
- Salad with dressing
- Bread with butter
- Choice: gelatin, sherbet, water-ice *or* fruit
- Coffee with cream and sugar

Suggestions.—Greater efficacy can be accomplished by the admin istration of dilute hydrochloric acid before meals than any dieteti arrangement.

he event that the gastric acidity should be so increased as to the patient complain of heartburn or water-brash, the most acid foods such as apples, citrus fruits, peaches, pickled foods, , etc., should be eliminated.

the elderly, if considered wise, ½ or 1 ounce of spirits can be ribed once or twice daily, fifteen minutes prior to meals. By nanner of administration the liquor will tend to stimulate the ic acid. It has been found in alcoholics in general, that the continued excessive use of alcohol as a beverage diminishes the al gastric acid.

HYPOTENSION.

scussion.—Hypotension is not a disease but a symptom. It is ndication of some general systemic condition. A failing myoium, acute illnesses, particularly typhoid, diphtheria, the themata, rheumatic fever, influenza, or the convalescence efrom, are common and capable etiologies. Infrequently, a ein deprivation may prove to be an etiologic factor.

is uncommon in the general course of practice to come upon s in which the blood-pressure is sufficiently low to have the otension produce symptoms in itself. However, those cases do e to our attention and demand remedial measures. Lowered od-pressure is not an indication of perfect health and should be d as a guide to the general physical tone of the patient.

he restoration of a low blood-pressure to normal consists in the ing of the general body tone. Exercise, prescribed baths, alteran of the general daily regimen and other factors are, in the main, tributory to success.

f any is of proved worth, the diet is similar to that for secondary emia in which the various minerals and vitamins predominate. ndular insufficiencies should not be overlooked as a possible ology. A high-protein diet, in the presence of a protein deficiency, ndicated. Refer elsewhere for suitable menus.

INFLUENZA.

Discussion.—Owing to the rather short and limited course of uenza, the diet indicated for the early part of the disease should the absence of diet rather than its prescription. It is suggested t for the first two or three days nothing whatsoever should be en, except small quantities of frequently administered liquids in form of milk, milk preparations, fruit juices or alkalinized ters. Whenever possible, sweetened liquids should be ingested an attempt to offset the generally present acidosis. Refer to id Foods.

As is well recognized, anorexia is a most commonly associated nptom and very frequently is exhibited by the patient as, not y a lack of desire to eat, but also the inability to appreciate a mal taste of food.

Commencing the third day, the taking of a full fluid or semid diet should be enforced. The caloric value of this diet should as high as possible.

As is commonly experienced following a typical influenzal att[…] there is frequently present a jaded appetite which lasts from […] to six weeks. In these instances the proper diet should be s[…] meals at the usual hours augmented by interval feedings. Inve[…] gation of the gastric acid content often reveals further diet[…] indications.

Omit.

Solid foods throughout the early course of the disease

Limit.

Upon the institution of the high-calorie diet, limit the foods little or no caloric value. Refer to Carbohydrates in Vegetal[…] and Fruits

Convalescent Diet.

Typical Menu.

Breakfast:
- Fruit juice *or* puréed fruit
- Cooked cereal with cream and sugar
- Toast *or* rolls with butter
- Milk *or* coffee with cream and sugar

Midmorning:
- Eggnog, milk *or* buttermilk

Luncheon:
- Cream of vegetable soup
- Minced meat *or* eggs, except fried
- Puréed vegetable
- Bread with butter
- Milk or tea

Midafternoon:
- Fruit *or* vegetable juice with egg white

Dinner:
- Minced meat *or* fish
- Baked *or* mashed potato
- Puréed vegetable
- Bread with butter
- Simple dessert
- Milk *or* coffee

Bedtime:
- Milk *or* cocoa

Suggestions.—In the writer's experience many cases suffering fro[…] influenza exhibit personal temporary obsessions concerning foo[…] This condition can be likened to that of the pregnant woman. I[…] several instances the sole mainstay of the diet during the acu[…] period have been very hot or very cold milk, sauerkraut juice, pickl[…] juice, tomato juice, etc. The insistence of the taking of other foo[…] in these cases has been without avail.

The diet for convalescent pneumonia is also perfectly adaptab[…] to the conditions herewith outlined. For further menus refer t[…] Febrile Conditions.

IRRITABLE COLON, NON-ULCERATIVE COLITIS.

CLARENCE FULLER, M. D.

scussion.- These conditions are the subjects of much confusion difference of opinion and a diagnosis of one or another is very made, usually erroneously, because of the confusion and lack xact knowledge regarding etiology and pathology. In the past years much progress has been made toward differentiating these litions on the basis of pathology, and it is becoming more generaccepted that they are only different stages in one disease procand that the first two stages, *viz.* constipation and irritable coare functional disturbances, with no organic tissue changes, and the third stage, *viz.* colitis, is an organic disease, in which there tissue changes, *i.e.* inflammation. In many cases it is impossible letermine from the clinical symptoms, stool examinations and noidoscopic examinations whether or not inflammation is present hout examining washings from the bowel mucosa for the presence absence of a cellular exudate; the absence of a cellular exudate ans the absence of inflammation and the presence of a cellular date establishes the presence of organic tissue change, namely ammation.

t should be clearly understood that *atonic* constipation, irritable on, and colitis are exceedingly rare, and occur only in patients h autonomic imbalance in the form of sympathicotonia, with adional manifestations throughout the body. Atonicity or dilatation y occur in parts or all of the colon in the course of the disease, and ferentiation should be made from idiopathic dilatation or Hirschrung's disease.

The etiology of these conditions is still obscure. According to some, cause is neurogenic, according to others it is purely local in origin, d still others claim it is allergic in origin. The writer believes that onset is due to improper dietary and hygienic habits, in a vagoic individual, which lead to the use of cathartics, enemas, and irations, resulting in the colonic dysfunction.

Associated with the colonic disturbances are many reflex sympns, neurotic symptoms, and impairment of general health.

Clinically, tenderness may be exhibited over any part of or all of colon, with disturbed bowel function, as a rule constipation. The sence of mucus in the stools which was formerly considered by ne to be the sine qua non for establishment of diagnosis, and which d to such terms as "mucous colitis", etc., is now recognized as the rmal reaction of the mucous membrane to irritation from whatever se, and does not mean the presence of inflammation.

Divergence of opinion exists as to the dietetic management of these nditions and this has led to unnecessary confusion. The colon, ng already spastic, contraindicates the institution of a spasm-proing diet, such as one high in roughage, and this type of diet will gravate the existing condition. It is obvious, therefore, that in the e cases of atonic colon, the opposite type of dietetic therapy is inated, and all of the foods which are eliminated from the diet in a

patient with a spastic colon because of their ability to produce irr ting bulk, should be added to the diet.

The author has found the diet schedule which follows to be eff ive in the management of almost all cases of colon disorders wh occur in either private practice or hospital work, except the cases fulminating ulcerative colitis, from overactivity as evidenced by dia rhea, to underactivity, as evidenced by constipation. Diet No. 1 almost pure carbohydrate, low fat, low protein, low residue, and fro this there is a gradual addition of protein, and bulk, in the form vegetables and fruits, to the No. 7 diet which is a maintenance di for any average individual. These diets are deficient in vitamins a minerals and these should be supplied in the form of one of the stan ard potent vitamin-mineral preparations. The fruit or tomato juic may not be well tolerated, but it is well to try them early in the di etetic regimen and discontinue them if there is a digestive upse Usually four or five days on each diet is necessary before progressin to the next, and if the digestion is disturbed after the change, retur to the previous simpler diet until it is thought wise to again attemp an addition.

Progressive Bland Diets.

Bland Diet No. 1

Breakfast:

Cooked cereal such as strained oatmeal, cream of wheat, farina hominy, wheatena, with cream and a little sugar.
White bread, plain or oven-made toast with butter.
Kaffee Hag, Sanka Coffee or other coffee substitute; cream an sugar as desired.

10:00 A.M.

Toast, Holland Rusk, Zwiebach, with butter.
Ovaltine or a similar drink made with water and a little crean added to taste.

Dinner:

Plain boiled rice, macaroni, spaghetti, vermicelli, or noodles with butter added at the table or a little chicken gravy, tomato or mushroom sauce.
White bread or toast with butter.
Plain dessert such as rice, sago, tapioca, farina or bread pudding custard, junket, or plain gelatin with cream.

4:00 P.M.

Same as 10:00 A.M.

Supper: Like Breakfast.

Bland Diet No. 2

Same as Diet No. 1 plus:

Dinner:

White meat of chicken or turkey or heart of one lamb chop, or a little roast lamb, or fresh fish.

Bland Diet No. 3

e as Diet No. 2 plus:

ner:

reamed soups.

ef (roast, steak, chuck steak ground, broiled prime ribs, sirloin, pot roast), Ham.

aked, boiled or mashed potatoes.

ureed[1] vegetables such as —spinach, carrots, string beans, peas, small lima beans, celery, squash, tender young onions, beets, beet greens, asparagus tips.

Bland Diet No. 4

ne as Diet No. 3 plus:

akfast:

tewed fruit such as, prunes, pears, cherries, peaches, apricots, baked apples or apple sauce.

nner:

Vegetable soup without the vegetables.

Bland Diet No. 5

me as Diet No. 4 plus

eakfast:

One soft boiled or poached egg, or three slices of lean bacon, but not both.

inner:

Plain cooked vegetables such as: spinach, carrots, string beans, peas, small lima beans, celery, squash, tender young onions, beets, beet greens, asparagus tips.

Bland Diet No. 6

me as Diet No. 5 plus:

reakfast:

Prepared cereals such as: puffed rice, rice krispies, puffed wheat, corn flakes, or shredded wheat.

inner:

Once daily take raw vegetables such as: hearts of lettuce, endive, romaine, swiss chard, or water cress; also ripe tomatoes or hearts of celery; olive oil and lemon juice with a little salt as dressing.

Bland Diet No. 7

me as Diet No. 6 plus:

reakfast:

Raw fruit once daily such as: pears, cherries, peaches, apples, anges, tangerines, grapefruit, grapes or a ripe banana.

General Directions

1. Eat your meals at regular hours. Take sufficient time for your meals, eat slowly and chew your food thoroughly.
2. Do not eat when very tired or nervous, but sit or lie down for fifteen minutes and rest before going to the table.
3. Whenever possible lie down for three-quarters of an hour after a small meal and for one hour after a large meal, with a hot water bag on the stomach.
4. Avoid strictly all fried foods, hashes, made-over dishes, highly seasoned foods, rich sauces, pepper, spices and condiments. Avoid shellfish, eggs and milk except as occur in cooking, liver, kidney, sweetbreads, bone-marrow.
   Avoid smoked or cured fish, coarse fruits, and vegetables such as: broccoli, pickles, cucumbers, raw onions, turnips, cabbage, Brussels sprouts, corn, cauliflower, sweet potatoes.
5. Never butter toast while hot, and allow it to stand.
6. Do not drink water immediately before eating. Take no iced water or iced drinks. Take in all four to six glassfuls of water between meals each twenty-four hours.
7. Be out-of-doors as much as possible every day.
8. Avoid tobacco and alcohol in any form.
9. Secure at least eight hours sleep every night.
10. Adequate vitamin intake should be maintained by taking some good multiple vitamin preparation such as multicebrin or therapeutic formula vitamin capsule.

Suggestions.—Many food manufacturers now prepare strained fruits and vegetables and cooked, diced or pureed meats for infant feeding. Such preparations are entirely acceptable in the above diet schedules, can be readily obtained, and save a great deal of culinary time and labor.

The preceding menus may be varied greatly to meet existing conditions. The presence of obesity or asthenia will necessitate modification, with a reduction or an increase of caloric value. The presence of increased or decreased gastric hydrochloric acid may also require modification, in which case reference to the list of foods decreasing or increasing gastric acidity should be made and the menu modified accordingly. The presence of anemia will require higher protein as well as the introduction of hematopoietic foods.

The question of constipation is of paramount importance. The use of active catharsis is emphatically contraindicated. As a general rule, with the alleviation of spasticity, the bowel function is helped, but it is usually necessary, especially in the early stages of therapy, to supply additional non-irritating bulk in the form of agar-agar or a similar preparation. Occasional, judicious use of cleansing and retention oil enemata, and rarely a colonic irrigation, if properly given, are of service. If the stools are very hard and irritating, a small amount of mineral oil, one or two teaspoonfuls, at night, is helpful as a lubricant, but mineral oil must be used sparingly, as recent investigation has definitely established the fact that it is absorbed from the

stinal tract and may have toxic effects, as well as interfering with absorption of foods and vitamins from the small intestines.

Bran is contraindicated in the treatment of spastic bowel conons, for while it may stimulate peristalsis and lessen the actual stipation it is indigestible in the human gastrointestinal tract, l is subject to chemical and bacterial disintegration in the colon, h resulting fermentation and gaseous distention.

n association with these bowel disorders there is almost invariably underlying neurosis, which promotes fastidious dietary tenden-s. This necessitates judicious care in the sevring as well as the prepition of the various prescribed meals. Small rather than large rtions, with frequent feedings, will appeal to the jaded appetite.

Aside from diet and regimen, there are two important factors in treatment of these conditions,—an antispasmodic, such as bella-nna or one of its derivatives, or one of the newer synthetic preparaions, and a sedative, such as one of the barbiturates. The author's eference is a capsule containing ⅛ grain each of the extract of bella-nna and phenobarbital, one capsule to be taken after each meal d at bedtime; in his experience this has proved to be the most fective of any of the many preparations tried, it is not habit-formg, and only on the rarest occasions will this amount of belladonna use dryness of the throat or blurring of vision, in a sensitive indidual.

Reference can be made to Foods Lowest in Cellulose (roughage) d Bland Foods in order to facilitate further amplification of the enus.

The diet in chronic ulcerative colitis comes in the same category as e conditions heretofore considered, but the diet in acute and/or lminating ulcerative colitis is a matter for separate consideration.

JAUNDICE.

Refer to page 443.

LACTATION.

Refer to page 419.

LEAD POISONING.

Refer to page 492.

LIVER, CIRRHOSIS OF.

Refer to page 442.

LUPUS ERYTHEMATOSIS AND VULGARIS.

Refer to pages 304 and 297.

LIVER DISEASES.

J. Russell Twiss, M. D.

Discussion.—There is probably no field of internal medicine in hich greater recent progress has been made than that of the diseases

of the liver. The concept of liver disease has been simplified by much clinical and investigative experimental work, with improvement in classification, pathology and treatment. Lesions comparable to those of humans have been produced in animals by many investigators, notably Himsworth and Glynn, Rich, Gorgy and Goldblatt, and Whipple. Hoagland has made contributions relative to the classification and management of the acute conditions. The management of the chronic liver conditions has veen greatly improved by the pioneer work of Patek and Post.

The present concept of liver disease, which has taken the place of the previously-complex classifications of various types, is that it is fundamentally a damage to the liver cell, regardless of whether the etiologic factor is chemical, physical, bacterial, or viral. The condition may be acute, chronic or healing, as is shown by fibrosis. The classification favored by Hoagland is that of Bloomfield who states that clinically all liver disease may be considered acute or chronic. Among the acute conditions are acute hepatitis and acute yellow atrophy of the liver. Chronic hepatitis may result from an acute condition, or it may come on insidiously. Included under chronic hepatitis are the cirrhoses. The nodular hyperplasia type may follow an acute necrosis of the liver. The portal type of cirrhosis seems to be gradual in onset and to follow in most cases a diffuse fatty infiltration of the liver with a subsequent diffuse hepatic fibrosis.

A brief discussion of the experimental work done in producing liver disease in animals should serve to indicate more clearly the underlying pathology of these conditions in humans. Himsworth and Glynn have demonstrated that the character and degree of liver damage in rats, in which lesions comparable to those of the human have been produced, were dependent upon the qualitative and quantitative restriction of protein in the diet. With a severe restriction of the protein in the diet, acute yellow atrophy and early death were produced in most cases. With lesser restrictions fatty infiltration of the liver was produced; this was followed in the course of time by a diffuse fibrosis of the liver and finally typical portal cirrhosis. These changes could be prevented by the addition to the diet of one of a number of lipotropic substances such as methionine, casein, cystine, choline and Brewers yeast. Similar results have been obtained by other investigators. The practical aspects of the protective value of these substances, particularly protein, have been stressed by Ravdin, Whipple, Rich and others. Deserving of special mention is that the lethal effect of chloroform anesthesia on a protein-depleted dog can be prevented by adequate pre-operative feedings of protein, or by the addition to the diet of equivalent amounts of lipotropic substances.

Clinically, the etiologic factors in acute forms of hepatitis can be determined in most cases with a considerable degree of accuracy. The medical and dietary management is essentially the same in all cases. The etiologic factors of the chronic conditions is more subject to difference of opinion, particularly in regard to the cause of portal

osis. While it is conceded that the condition is common in alcoholics, nevertheless recent work has indicated that portal cirrhosis rimarily a deficiency disease dependent upon protein deficiency. hosis, associated with dietary deficiency, has been found to be valent in countries where little alcohol is available. A large proion of alcoholics do not develop cirrhosis, the cause of the hosis is considered to be the fact that alcoholics do not eat a icient amount of protein. The experimental work previously ed has furthermore indicated that the rôle of carbohydrates and amins is secondary to that of the proteins. The patients who e been on a diet high in fat and cholesterol, however, especially se who have a low intake of lipotropic substances, have been nd to develop fatty infiltration and subsequently portal cirrhosis he liver. These facts have also been confirmed by animal experints.

Since the general medical and dietary management of the various pes of liver disease is much the same, regardless of etiology, the sent discussion will be limited to a few of the more commonly nd types of liver conditions. The essential factor in any given se, especially in the presence of jaundice, is to determine whether e condition is medical or surgical. In medical conditions a patient ould not be subjected to a hazardous operation, expecially if the tient is in a serious condition. On the other hand, obstructive sions require surgical interference at the earliest possible time to event irreparable damage to the liver from back pressure. The oper decision is frequently difficult; it should be based upon a comete and accurate diagnostic investigation, carried out as early in e course of the disease as possible.

Hepatitis, acute.—Among the more prevalent forms of hepatitis e the acute infectious hepatitis and homologous serum hepatitis hich usually follow a transfusion or plasma infusion. The acute fections form is characterized by a prodromal period of fever, ausea, vomiting and symptoms of an infection of the upper resiratory tract, while the onset of the serum jaundice is usually sidious. In all cases a careful history should be taken to rule out e possible factor of toxins or drugs such as cinchophen or arsenic, possible occupational hazards. Clinically the jaundice is charterized by the onset of dark urine and light colored stools, freiently with pain and tenderness of the right upper quadrant. aboratory tests which are of diagnostic value are the Harrison spot st for bilirubin in the urine, the galactose tolerance test of Bauer, e cephalin flocculation test of Hanger, and the thymol turbidity st of MacLagan. In the early stages the bromsulphalein test is so useful.

The managment of acute hepatitis consists of early and prolonged d rest, until such time as a full battery of liver function tests dicates that the function of the liver has practically returned to rmal. The diet in the early stages of nausea and vomiting is cessarily limited. At this time the patient should be in a hospital, ith the liberal use of intravenous glucose and if tolerated protein

hydrolysate. Duodenal drainage is frequently of great assista relieving the patient of anorexia, nausea, and vomiting, as we relieving the back pressure upon the liver which has resulted from inability of the patient to eat. As soon as possible, a diet of m fruit juices, cereal, stewed and canned fruits, tea and other ea digestible food is begun. Intermediate feedings of milk are add the full No. 6 diet being given as soon as possible. Supplemen treatment includes the use of high potency multiple vitamin c sules, injections of crude liver extract intramuscularly, Brew yeast powder as tolerated, fluids are forced. For those unable take Brewers yeast powder, in dosage of 15 to 30 grams daily, c sules of vitamin B complex are recommended.

Hepatitis, Chronic.—The chronic form of hepatitis may foll the acute form, especially in those not kept in bed for a sufficien long period of time, or those not adequately treated. The chro hepatitis may follow an acute or subacute atrophy of the liver, or may begin insidiously on the basis of a fatty infiltration of the liv The symptoms of chronic hepatitis are frequently indefinite, co sisting of jaundice of a low grade which may be intermittent, nause vomiting, anorexia, discomfort after meals. Later there may supe vene the usual symptoms of cirrhosis of the liver.

The treatment of chronic hepatitis is essentially the same as tha previously described for acute hepatitis, with the exception that th intravenous infusions are usually not necessary in the less sever forms of the disease. The diet is of the utmost importance, the fu diet of 300 to 400 grams of carbohydrate is necessary, with 150 t 200 grams of protein and as much fat as is indicated and can b tolerated by the patient. The basis of the diet is that listed as Die No. 6. Supplementing the diet should be some form of vitamin B complex. Two capsules can be taken three times daily. Som prefer the use of Brewers yeast powder or tablets, large doses o which must be taken to produce the desired effects. Crude live extract is given intramuscularly, 2 to 4 cc. daily 2 or 3 times a week High potency multiple vitamins are again indicated. Protei hydrolysate by mouth may be of value.

Cirrhosis of the Liver.—Cirrhosis of the liver is considered t be a form of chronic hepatitis and is treated as such. However the main difference here is the fact that the cirrhosis is seldom diag nosed until the symptoms have reached a terminal stage at whic time the situation is frequently critical and therefore necessitating a much more concentrated form of treatment. The clinical course o these patients is usually that of a preceding period of alcoholism with the indefinite symptoms previously described. With this ther is a gradual enlargement of the abdomen, a loss of weight an strength, the onset of a hepatic facies and cachexia, sometimes edem of the ankles and hemorrhages of the gastrointestinal tract. Fol lowing these developements there may be nervous symptoms o twitching, irrationality, renal insufficiency, coma and death

Treatment of these patients should be carried out in the hospital The tests of liver function previously described are usualy positive Additional tests of value are the serum protein determination, th

...ion of the albumin-globulin ratio being of particular signif... The prothrombin time should be determined in all cases, ...he prompt institution of some form of vitamin K therapy if in...d. The terminal event of hemorrhage should be forestalled if ...le, for this, large doses of synthetic vitamin K are indicated. ...ermore, there should be an *X*-ray investigation of the gastroin...al tract for the purpose of ascertaining the presence of esopha... varices.

...e diet is again the high protein, high carbohydrate described as No. 6. Infusions of 5 per cent glucose should be given freely, ...the addition of 5 per cent protein hydrolysate if this substance ...licated by evidence of protein deficiency (and if the patient is ...o tolerate it). Large doses of crude liver extract are given intra...ularly. Morrison uses 4 cc. daily for ten days, then gradually ...hens the interval of administration. The high potency multiple ...mins are used, with capsules of vitamin B complex. With large ... livers, Beams has had good results therapeutically with the use ...rious lipotropic substances such as methionine, choline and ...ne: The final evaluation of these substances awaits further ...stigation. With a prolonged period of concentrated treatment ...the restriction of salt in patients having edema and ascites, the ...lts of treatment have been greatly improved in this group.

...aundice.—A discussion of the symptoms of jaundice with its ...rential diagnosis is a problem far beyond the scope of the present ...k. However, the principle of greatest practical importance is to ...rmine at the earliest possible moment whether the individual ... under investigation is medical or surgical. The possible presence **...hemolytic** types of jaundice must of course be considered; here ...e may be a history of familial jaundice or repeated attacks of ...ndice over prolonged periods of time. With this there may be ...ings of an enlarged spleen. Laboratory tests of significance are ...absence of bile and the presence of excessive amounts of urobilino... in the urine, the increased fragility of the red cells, the presence ...pherocytes and a high percentage of reticulocytes in the blood as ...l as the presence of anemia.

...ntrahepatic jaundice may occur with any of the forms of acute ...hronic hepatitis previously described. It is more common under ...age of forty years, is seldom associated with pruritus, is commonly ...ociated with pain and enlargement and tenderness of the liver, ...n dark urine and light colored stools. Laboratory tests usually ...d positive in these conditions are the cephalin flocculation and ...mol turbidity tests, an elevation of the serum globulin (with a ...inution of the serum albumin), with the intravenous galactose ...rance test there is an increase of the galactose of the blood, an ...eased serum bilirubin and an increased retention of bromsulph...n.

...xtrahepatic obstructive jaundice is more common over the age of ...y years. It may occur as the result of a common duct stone, a ...inoma of the head of the pancreas or biliary tract, a chronic cho...itis, or a number of other less common factors obstructing the ...mon bile duct. It must also be kept in mind, however, that the

obstructive lesion may be within the liver in a limited numb cases. In the early stages of this condition the above tests usually negative; in the later stages they become positive. Labo tory tests of significance here include an elevation of the alkal phosphatase of the blood, an elevation of the cholesterol of the blo and with malignancy of the common bile duct an absence of bile the duodenum as determined by the duodenal tube under fluo scopic guidance, and the absence of urobilinogen in the urine.

The dietary treatment of all types of jaundice is to give a high pr tein and high carbohydrate diet (Diet No. 6), with generous amoun of intravenous glucose in acute conditions. Prompt surgical rel of obstruction is essential. Splenectomy is indicated in famil jaundice with splenomegaly and spherocytosis. Medical treatme is indicated in the other conditions in accordance with that outli for the terminal stages of cirrhosis of the liver.

Finally, a word of precaution should be given relative to the pos sibility of a pancreatitis causing a jaundice. With acute forms jaundice, collapse and cyanosis, an acute hemorrhagic form of pa creatitis must be suspected. Here we have usually a transient ri in the serum amylase or lipase with a diminution of pancreatic fe ments in the duodenal bile.

Liver Function in Surgery.—In the presence of jaundice impair ment of liver function is inevitable. It is also usually present to greater or lesser degree in those patients who have chronic gall bladder disease, especially if associated with cholelithiasis. Th degree of liver impairment should always be determined pre operatively; tests found suitable are the bromsulphalein, the cho lesterol and ester ratio, the alkaline phosphatase, and the cephali flocculation tests. Heyd, Carter and Hotz have shown that carefu preoperative preparation of these patients is essential to reduc operative mortality and postoperative morbidity. Those under weight and having cardiac conditions should receive a prolonge course of treatment to build up weight, strength and resistance Those in acute phases must have intravenous fluids and the othe measures of treatment outlined. Intravenous fluids, including th hydrolysates and necessary vitamins, must be given before and afte operation. The standard diet is the high protein, high starch die previously described.

Post-operatively these patients should be fed as soon as circum stances will permit. During the first few days after operation th intravenous use of glucose in 5 per cent solution is indicated; th addition of 5 per cent protein hydrolysate is useful and seems to pro mote healing as well. After fluids, simple solids of the starchy food are gradually added, gradually resuming a diet which is indicated b the preoperative work-up. The unrestricted diet so frequently pre scribed by surgeons who tell the patient "eat anything you want is probably a potent factor in the creation of the so-called pos cholecystectomy syndrome. Generally speaking, these cases do bes when on a bland diet, avoiding fats and fried foods, gravies an roughage. The instruction of the general hygiene of the patient i matters of eating, exercise, and the avoidance of constipation ar

rs which are best handled by the internist, who can do much to the post-operative complications so distressing to the patient.

REFERENCES

R, W. H.: The Modern Treatment of Cirrhosis of the Liver. Med. No. Am. **29**:273, 1945.

, A. J.: The Treatment of Cirrhosis of the Liver with Choline and stine. JAMA **130**:190, Jan. 26, 1946.

Y, P and GOLDBLATT, H.: Observations on the Conditions of Dietary patic Injury in Rats. J. Exp. Med. **75**:355, 1942.

ORTH, H. P.: Nurtitional Factors in Liver Disease. Proc. Royal Soc. ed. **38**:101, November, 1944.

ORTH, H. P. and Glynn, L. E.: The Prevention of Experimental Mas- e Hepatic Necrosis by Methioneine. Clin. Science **5**:133, 1944.

WORTH, H. P. and GLYNN, L. P.: Massive Hepatic Necrosis and Diffuse epatic Fibrosis. Clin. Sc. **5**:93, 1944.

LAND, C. L. and SHANK, R. L.: Infectious Hepatitis, a Review of 200 ases. JAMA **130**:615, Mar. 9, 1946.

LAND, C. L.: The Therapy of Liver Diseases. Bull. N. Y. Academy of ledicine **21**:537, 1945.

ER, L. L., ROSS, J. and WHIPPLE, G. H.: Methione and Cystine Specific rotein Factors Preventing Chloroform Liver Injury in Protein-depleted Dogs. Amer. Jour. Med. Sc. **200**:739, 1940.

RISON, L. M.: The Response of Cirrhosis of the Liver to an Intensive ombined Therapy. Ann. Int. Med., **24**:465, 1946.

EK, H. J. and POST, J.: Treatment of Cirrhosis of the Liver by a Nutritious Diet and Supplements Rich in B complex. J. Clin. Invest., **20**:481, 1941.

DIN, I. S., THOROGOOD, E., RIEGEL, C., PETERS, R. and RHOADS, J. C.: The Prevention of Liver Damage. JAMA, **121**:322, Jan. 30, 1943.

H, A. R. and HAMILTON, V. D.: The Experimental Production of Cirrhosis f the Liver by means of a Deficient Diet. Johns Hopkins Bull., **66**:185, 1940.

MALIGNANCY, GASTRO-INTESTINAL.

CLARENCE FULLER, M.D.

Discussion.—The diet in malignancy of the gastro-intestinal tract pends upon the nature and site of the disease and whether it is the obstructive or non-obstructive type.

The principles of the diet are such as to afford the patient as ch nutrition as possible, generally in a restricted volume. Coarse ds, foods of hard consistency and foods generally recognized as ng indigestible are to be studiously avoided. Specifically, the t should be soft, highly nutritious and concentrated. The pro- n content should be maintained at the optimum in order to offset present or impending anemia.

n cases of obstruction, any food should be omitted which will d to increase this condition by superimposing spasm. Exces- ely hot and cold foods, together with those high in roughage, uld not be included in the dietary.

As is frequently the case in malignancy of the stomach, there is associated achylia gastrica. The recommendation of acid-induc- foods, together with the administration of dilute hydrochloric d, is specifically indicated.

With the obstructive type of cancer, irrespective of its site, resort st be made to a concentrated diet. Augmentation by artificial

methods of feeding is often required. Refer to Supplem Methods of Feeding.

Any specific dietary directed against malignancy, owing t present lack of knowledge of the etiology, cannot help but re itself into an empiricism. Efforts have been made by ma compound diets low in nitrogen, low in sulphur, or based on other suspected metabolic insufficiency. Centanni, an advoca dietetic treatment of malignancy, has sought to modify the by reducing all those substances which promote growth and inc those which tend to inhibit growth. Beneke found that ca was more frequent in carnivora than in herbivora and more mon among people who ate excessive amounts of meat. recommendation, based on this observation, suggested food lo nitrogen.

The generally-accepted diet is simple, readily assimilable and in protein. The customary anorexia very frequently strains ingenuity of the practitioner and dietitian.

Naturally, the dietetic recommendation must be of two ty for the obstructive and the non-obstructive case.

Omit.

Non-obstructive: Coarse vegetables; foods containing a h starch content; foods which tend to produce a large bolus; fo low in caloric value.

Obstructive: In these instances the diet is limited to liquid a semi-solid foods. As an underlying general principle, it is wise effect a concentrated liquid diet, hence limiting the volume ingest at any mealtime. This is best accomplished by milk in any fo found palatable to the individual. It is frequently found adva tageous to augment the milk by the addition of highly concentrat foods, puréed or strained vegetables, eggs, dried milk, protein m or malted milk. Cream soups to which puréed vegetables have be added are generally well tolerated. Cereals, particularly tho served with sugar and cream, command a very high position in t list of recommended items.

Beef extracts, beef jellies and clear broths may be given free but it must be borne in mind that the caloric value of these ite is relatively *nil*. On the other hand, they stimulate gastric acidi a desirable accomplishment. Seasonings, and condiments likewi stimulate gastric acidity. Fruit juices augmented by additio sugar are advised. Refer to Fluid Foods, Soft Foods and Foo Lowest in Water.

Diet for Non-obstructive Type.

Typical Menu.

Breakfast:

Fruit
Cooked cereal with cream and sugar
Egg, bacon *or* ham
Toast *or* roll with butter
Milk *or* coffee with cream and sugar

DIET FOR OBSTRUCTIVE TYPE.—(*Continued.*)

rning:
or buttermilk

on:
m of vegetable soup
ce: meat, fish, eggs *or* cheese
réed vegetables
d with butter
ed fruit
or tea

ernoon:
nog, milk, ice-cream *or* junket

er:
sommé *or* bouillon
t *or* fish
ıréed vegetables
ad with butter
ice: fruit, gelatin, water-ice *or* cheese with crackers
k or coffee

me:
t milk

DIET FOR OBSTRUCTIVE TYPE.

Typical Menu.

kfast:
uit juice
rained cooked cereal with cream and sugar
elba toast, Zwieback or Holland rusk with butter
ilk *or* coffee with cream and sugar

norning:
oth *or* bouillon with beaten egg

heon:
eam of vegetable soup
ft-cooked egg *or* minced meat
réed vegetable
réed fruit with cream

fternoon:
ttermilk, milk *or* cocoa

ıer:
rained soup
inced meat *or* fish
ouréed vegetables
ft dessert

ime:
t milk *or* cocoa

NOTE.—In the obstructive type, water should always be repla by some caloric-bearing fluid. No foods should be served ex sively hot or cold.

Suggestions.—Vomiting commonly intervenes in the obstruc type. The reduction of the volume of food at each meal toget with the prescription of a diet of thicker consistency is indicated

Vomiting may be caused not only by the organic obstruction, b frequently also by superimposed spasm at the site of the obstru tion, or associated pyloric spasm. In the event that it is due spasm, gastric rest with adequate doses of belladonna tends to t over this condition.

At times, a six- to twelve-hour rest from feeding accompani by gastric lavage, arrests vomiting. A daily lavage early in t morning will rid the stomach of any overnight residue hen aiding the patient to ingest sufficient food for maintenance. Ofte many patients, due to the gastric distress, suffer from insomn If this is attributable to gastric residue, nightly lavage will great aid. Refer to Soft Foods and Bland Foods.

MALNUTRITION IN INFANTS AND CHILDREN.

VINCENT LARKIN, M.D.

Malnutrition is a term indicating defective nutrition, manifest by failure of the infant or child to gain weight and to grow as does t average child. It may vary from slight to severe. According Jeans, normal nutrition indicates that the infant remains within to 15 per cent of the average weight for his age, birth weight an length. As pointed out by Barkorka, however, malnutrition ma include many patients from those who are under average weight bu in good health to those who are emaciated by starvation or disease The term marasmus is reserved for severe degrees of malnutrition infancy.

Etiology.—Malnutrition is due to reduction in the quantity of foo available to the infant or child below the requirement for norm growth and maintenance. The supply of food may be too smal as in starvation and therapeutic under-feeding, or disease proce may reduce the ability of the infant to absorb and utilize the food may increase the needs of the body for food. Psychogenic facto operate in older children to reduce the food intake while adolescen may deliberately go on reducing diets to avoid obesity.

Starvation.—Partial starvation may be carried out accidentally i infants through improper construction of formulas and imprope methods of feeding, but at the present time this is not common i this country. More frequently the starvation is deliberate and carried out in the treatment of diarrhea. In some instances the in fant is able to gain on an adequate feeding despite a mild diarrhe but will fail to gain on a reduced feeding even though the diarrhe has been checked. Occasionally an ignorant mother will mistake he instructions and substitute whole milk for evaporated milk in

a and even though she increases the volume of the feeding to me the infant's hunger, the formula will be so dilute that the cannot ingest large enough quantities to satisfy his needs. If fant is breast fed and failing to gain weight, he should be ed immediately before and after each feeding for twenty-four to determine how much breast milk is being obtained. An oc-al placid infant will not cry when hungry though the quantity ast milk is actually too small and the infant is failing to gain t.

er infants and young children are frequently capricious in their and dislikes for foods and if they have been sufficiently spoiled may be able to force the parents to feed them an inadequate or lanced diet which eventually leads to undernutrition. Coaxing orcing, which many parents resort to in their attempts to in-e the child's intake of food, often lead to persistent vomiting or al to eat (See Anorexia and Psychological Aspects of Infant ing).

lolescents, particularly girls, often develop a fear of obesity, icularly if one or both of the parents are unusually obese, and deliberately reduce the intake of food below their minimal needs.

astro-intestinal Disorders.—Chronic disturbances of the gastro-stinal tract lead to profound states of malnutrition, most fre-ntly in infancy. Diarrhea, particularly infectious diarrhea of the born, may be very prolonged in its course and marked by severe erbations each time oral feeding is attempted. The nutrition be maintained for days and even weeks under the best pediatric by parenteral feedings of vitamins, minerals, protein, carbohy-te and water in these patients, but frequently malnutrition pro-sses to marasmus, despite all measures that are taken. Celiac ase of moderate severity quite regularly results in malnutrition, n of severe degree (See Celiac Disease). Chronic ulcerative tis in older children is similarly a cause of moderate to extreme nutrition.

rolonged vomiting in infancy is most commonly associated with oric stenosis and pyloric spasm and if medical treatment is not fully carried out or is prolonged beyond the time when improve-t is noted, extreme degrees of malnutrition may result. A patient pyloric stenosis may also develop a starvation type of diarrhea therapeutic under-feeding may be instituted to overcome this rhea and the malnutrition increased. Rumination generally es so large a loss of food that nutrition is greatly impaired.

nfections.—Acute infections, no matter how severe, rarely cause ificant or prolonged degree of malnutrition in infants and children. n when they recur frequently, *e. g.*, tonsillitis every three to four ks, nutrition is usually maintained at a normal level because the d eats well between illnesses. Low grade chronic infections, how-, are responsible for many cases of moderate malnutrition. Un-ted congenital syphilis, now much less common than it used to be, cause malnutrition in infants. Much more frequent are in-ions of the respiratory tract, chronic infected tonsils, hyper-

trophied adenoids, sinusitis, and recurrent asthmatic bron
Ear infections respond quite promptly to chemotherapy and a
biotics and are rarely a cause of malnutrition at the present t
Pyuria, especially in young girls, may be manifested only by an
and failure to gain weight and should be searched for by repea
urinalysis when other causes are lacking. The majority of th
infections seem to operate by reduction of the child's appetite, d
turbing sleep, and bring about persistent chronic fatigue. O
infrequently do they cause digestive disturbances of any severi
such as parenteral diarrhea.

Congenital Anomalies.—Abnormalities of the heart with p
sistent cyanosis interfer with absorption and utilization of foods a
proper growth. Similarily, developmental defects of other systen
gastro-intestinal, genito-urinary, central nervous system, interf
with proper nutrition. Mental retardation often results in refusal
all foods except milk and sometimes even milk is taken only in sm
quantities. Subdural hematoma in infancy may produce persiste
vomiting, subseptibility to infection, and malnutrition. Infants wi
cleft palate and hare lip require considerable skill in their feeding a
often must be gavaged to maintain adequate nutrition. Many
these infants fail to thrive because of the difficulties of feeding the

Metabolic Disorders.—Diabetes mellitus is uncommon in infan
and children and impairs nutrition only when the disease is not co
trolled. Blood dyscrasias, such as Cooley's anemia and leukem
result in moderate to profound malnutrition. Malignant tumors
all types cause extreme malnutrition if the course of the illness
prolonged, as so often it is.

Premature Infant.—Premature infants frequently are unable t
absorb fat properly and may fail to gain weight on an adequat
caloric intake until part of the fat in the formula is removed an
replaced by additional carbohydrate or protein.

Pathology.—The infant and child require extra food for growt
beyond that needed for maintenance and repair of tissues. Even
there is a sufficient intake of food to supply maintenance require
ments under-nutrition will develop because growth continues thoug
at a slower rate when less food is available than when adequat
food is available. As the food supply decreases, body stores ar
utilized to meet the needs of metabolism and growth as long as th
stores are available. Carbohydrate stores are first used and the
disappear in a few days. Fat stores are then drawn upon and th
fat is transported to the liver and metabolized. As the quantity o
fat metabolized increases, ketosis appears. Finally protein must b
withdrawn from the muscles and organs to supply energy. Th
infant or child gradually becomes thinner and more emaciated a
the subcutaneous fat disappears. Muscles and organs next suffe
from lack of fuel and the rate of their metabolism begins to slow
down. The basal metabolic rate decreases, circulation of the bloo
slows, and the ability of the gastro-intestinal tract to absorb food i
reduced. This in turn increases the malnutrition, weakens the hear
and blood vessels and further decreases the supply of blood to th
tissues. Resistance to infection lessens, and the infant is subject t

-tions which he is unable to overcome and which eventually may death. Dehydration is frequent and may be greatly accen-d by the onset of diarrhea.

agnosis.—A careful detailed history of the diet must be obtained -ding method of preparation of formulas, the ingredients of the -ula, the quantities of food taken, the frequency of feeding, and -lemental feedings. In this way the adequacy of intake of -us food elements may be readily ascertained and errors in -ing corrected. A history of abnormal symptoms should be -ht. If there has been vomiting, the type of vomiting, frequency quantity of vomitus, should be determined as exactly as pos-; the severity and duration of diarrhea; frequency and type of -ctions; appetite, rest, and activity should be investigated.

careful physical examination should reveal gross cardiac ab-nalities and diseases of the respiratory tract. Selective labora- tests, as X-ray of the chest, complete blood count, repeated -alysis, blood Wassermann, and blood urea nitrogen will assist -xcluding the majority of physical abnormalities capable of pro--ing malnutrition.

Dietary Treatment.—Infants who show poor weight gain often -uire only an increase in the daily caloric intake, with the formula -culated in simple fashion (See Artificial Feeding). If the larger -ume of feeding is vomited, a larger caloric intake may be achieved -thout increase in volume of formula by reducing the amount of -ter in the formula. Premature infants who fail to gain on average high caloric formulas (120 cal/kg.) should have the formula -anged to a preparation with a low fat and high carbohydrate and -otein content (See Premature Infants). Breast fed infants who -tain insufficient breast milk should be offered a supplemental -rmula after each breast feeding.

Malnourished infants must receive a caloric intake that is cal--lated on the basis of expected normal weight for their age, rather -an on actual weight. A high caloric intake (up to 200 cal/kg.) therefore indicated but the infant may not be able to take the -tire feeding at first. The protein need is larger than normal, to -place metabolized tissue and to build new tissue. Similarily a -eater need for minerals is encountered and must be supplied. -ese needs cannot be met by unmodified human milk, but may be -t if dried skim milk is added to the human milk. The fat content the average formula may be too large for the malnourished infant -d for this reason a low fat, high protein, high carbohydrate food is -visable. These requirements of malnourished infants are met by -eparations designed for use in the feeding of premature infants -ee Premature Infants). As the infant thrives and approaches -rmal weight for his age the formula may gradually be changed to -whole milk formula. Acid whole cow's milk fortified with carbo--drate also makes a satisfactory feeding for malnourished infants, -ce it is a concentrated feeding of high caloric and mineral content -d supplies acid which inhibits bacterial growth in the upper in--tines and promotes rapid emptying of the stomach.

Vitamins are required for the malnourished infant as they a the normal infant and should be supplied in optimum qua for infants of their age. Small repeated whole blood tran are very helpful in stimulating the appetite of marantic in The transfusions correct anemia, replenish the depleted blood tein and supply carbonic anhydrase, which is deficient in the of infants.

Malnutrition in older children is usually of moderate degree due to actual starvation or severe organic disease. The com type, related to infections of the respiratory and gastro-inte tracts, first requires treatment of the infectious process. A adequate in all respects for the age of the child should be cal according to principles discussed elsewhere (See Nutritional Req ments of Infants and Children). Anorexia is readily overcom these children by frequent administration of vitamin B complex liver extract, twice weekly for three to four weeks, given by intramuscular injection. An increase in appetite is noted prom and the recommended diet is then taken readily. The gain in we is most gratifying on this regime.

MYOCARDIAL FAILURE

ROBERT MCGRATH, M.D.

This term may be applied to either ventricle but usually both involved.

At the present time there is general agreement that retention sodium is an important factor in congestive failure. This has b stated over a period of many years by certain investigators especially by H. A. Schroeder in 1941 and by F. R. Schemm in 19 There are two other considerations, first, a neutral diet with sligh acid ash and the second a high fluid intake up to 4000 cc. in twen four hours. The reaction of the diet is not of great importa since ammonium chloride or similar acting drug can be given for acidifying effect. Good results are obtained from a fluid intake 2500 to 3000 cc. The patient will usually take this much flui permitted to drink water as desired. Forcing fluids will be requi to reach the total of 4000 cc. advised by Schemm.

In 1866 Karrell introduced the milk diet known by his name wh has been used so commonly at the start of treatment for advan congestive failure. This consisted of 200 cc. of skimmed milk f times a day without other fluids, and is an alkaline ash diet. success was attributed to the low fluid intake but actually it lay the low sodium content of 0.4 to 0.5 gm. According to the pres viewpoint ammonium chloride should be administered and wa allowed as desired. After two to four days, one of the diets d cussed in the next papagraph should be started as judged by t progress the patient has made.

In general it is better to begin the treatment of a severe case congestive failure with a low sodium neutral ash soft diet rather th the Karell diet. As improvement occurs a full diet of the same ty may be substituted, the caloric content being reduced while at r

) for the patient of average weight and 1000 calories for the ight case. The sodium content of such diets should be be- 0.5 and 0.6 gm. Eggs, meat, fish and fowl are acid ash foods. s, plums, and cranberries also produce an acid ash but other as well as milk and vegetables are alkaline ash foods. The fluid intake should be ordered independently of the diet be- it is properly a part of the regimen rather than the diet.

many ambulatory cases of mild congestive failure, the follow- rections, which are concerned only with sodium content, are ient:

Milk should be limited to 200 cc. per day.

Directions for all Low Sodium Diets (listed below).

erweight cases and even in those of normal weight the problem ying or making low-salt bread can best be solved by omitting read from the diet in patients following the above directions.

e sodium content of the average diet without salt restriction to 6.0 gm. per day. When salt is not added in preparing food t the table, these figures are reduced to 1.2 to 1.5 gm. per day.

here are certain disadvantages to low sodium diets. The first e common complaint that the food is tasteless but this dislike be largely overcome if the diet is continued for some time. The nd is the difficulty experienced by patients who must eat in res- rants. The third is a rather rare complication in which sodium letion symptoms may develop when a mercurial diuretic is given onjunction with a low sodium regimen.

n additional factor of great importance in planning a low sodium ke is the sodium content of the water used by the patient. The owing quotation and the accompanying table are from a publi- ion of the Research Laboratory of Mead Johnson and Co. en- ed "Sodium and Potassium Analyses of American Foodstuffs, terminations by Flame Photometer, Fourth List, May 1947, with litions and Corrections":

Assuming an average daily consumption of 2 liters of water in d and drink, it follows that if the water contains as much as 25 of sodium per 100 cc., the patient will receive 500 mg. of sodium n the water alone, and a diet limited to this amount becomes ossible. It would be a safe rule to use only distilled or de- ized water for sodium-restricted patients wherever the municipal ply contains more than 10 mg. of sodium per 100 cc.

ortunately, the municipal water supplies of most cities are so in sodium that they are entirely suitable for use in low-sodium s. There are, however, some outstanding exceptions. In some munities the water is noticeably "hard", *i. e.*, it contains much ium or magnesium. Hardness or softness has no bearing on the ium content of water, except that when hard water is softened base-exchange apparatus the calcium and magnesium are re- ed by sodium in the ratio of 2 atoms of sodium for each atom of ium or magnesium. Therefore water which has been softened is ays suspect as regards its suitability for low-sodium diets and for preparation of Lonalac.

he following table gives the sodium (and potassium) content of

the waters of representative cities. Included are the principal c
of the United States, the capitals of most states and many pl
important as medical centers. The samples were taken in the wi
and spring of 1947, and the analyses were made with the fl
photometer. Seasonal variations are known to occur, especially
river waters, but river waters rarely contain much sodium.

TABLE 32. Sodium and Potassium Content of the Waters of Representa
Cities of the United States. (Mead Johnson and Co.—1947).

Place	Na mg. per 100 cc.	K
Aberdeen, S. D.	20.0	2.0
Albany, N. Y.	.2	.2
Annapolis, Md.	.2	.2
Ann Arbor, Mich.	2 0	5
Atlanta, Ga.	.2	2
Augusta, Me.	.2	.2
Baltimore, Md.	.3	.2
Biloxi, Miss.	23 0	.6
Birmingham, Ala.	2 0	.3
Bismarck, N. D.	6 0	6
Boise, Ida.	2 0	.3
Boston, Mass.	.3	.2
Buffalo, N. Y.	.7	.3
Carson City, Nev.	.4	.3
Charleston, S. C.	1.0	.3
Charlottesville, Va.	.2	.1
Cheyenne, Wyo.	.3	.2
Chicago, Ill.	.3	.1
Cincinnati, Ohio	7	.3
Cleveland, Ohio	1.0	.3
Columbia, S. C.	.4	.2
Columbus, Ohio	5.0	.6
Concord, N. H.	.2	.1
Dallas, Tex.	3.0	.5
Denver, Col.	3.0	.2
Des Moines, Iowa	1.0	.4
Detroit, Mich.	.3	.1
Dover, Del.	2.0	.5
Durham, N. C.	.4	.2
El Paso, Tex.	7.0	.6
Evansville, Ind.	2.0	.5
Frankford, Ky.	.3	.1
Galesburg, Ill.	30.0	2 0
Galveston, Tex.	34.0	.7
Harrisburg, Pa.	.2	1
Hartford, Conn.	.2	1
Helena, Mont.	3	2
Houston, Tex.	16 0	.6
Indianapolis, Ind.	1 0	.3
Iowa City, Iowa	5	3
Jackson, Miss.	.4	2
Jefferson City, Mo.	3 0	.4
Jersey City, N. J.	.3	2
Kansas City, Mo.	10.0	3 0
Lansing, Mich.	1.0	.5
Lincoln, Neb.	3.0	.7

Place	Na mg. per 100	K
Little Rock, Ark.	.1	.
Los Angeles, Cal.:		
Aqueduct source	6 0	[illegible]
Metropolitan source	17 0	[illegible]
River source	5 0	[illegible]
Louisville, Ky.	2 0	[illegible]
Madison, Wis.	4	[illegible]
Marion, Ohio	17 0	[illegible]
Memphis, Tenn.	2 0	[illegible]
Miami, Fla.	2 0	[illegible]
Milwaukee, Wis.	3	1
Minneapolis, Minn.	5	[illegible]
Minot, N. D.	25 0	[illegible]
Montgomery, Ala.	8	1
Montpelier, Vt.	1	1
Nashville, Tenn.	3	2
Newark, N. J.	2	1
New Haven, Conn.	3	1
New York, N. Y.	3	2
Oakland, Cal.	3	1
Oklahoma City, Okla.	10 0	8
Olympia, Wash.	5	3
Omaha, Neb.	8 0	1 0
Philadelphia, Pa.	2 0	4
Phoenix, Ariz.	11 0	7
Pierre, S. D.	9 0	5
Pittsburgh, Pa.	6 0	5
Portland, Ore.	1	1
Providence, R. I.	2	1
Raleigh, N. C.	4	1
Richmond, Va.	7	2
Rochester, Minn.	7	2
Rochester, N. Y.	3	2
Sacramento, Cal.	3	2
St. Louis, Mo.	5.0	5
St. Paul, Minn.	5	3
Salem, Ore.	2	1
Salt Lake City, Utah	8	2
San Diego, Cal.	5 0	5
San Francisco, Cal.	1 0	3
Seattle, Wash.	2	1
Springfield, Ill.	8	3
Syracuse, N. Y.	2	1
Tallahassee, Fla.	3	1
Trenton, N. J.	1	1
Washington, D. C.	3	3
Wichita, Kan.	5 0	5

lditional data on public water supplies can be obtained from the
us state and municipal laboratories, and from a U. S. Govern-
bulletin compiled some years ago, "The Industrial Utility of
Public Water Supplies in the United States, 1932" (Geological
ey Water-Supply Paper 658), Washington, Superintendent of
uments, 25 cents."

IRECTIONS FOR ALL LOW SODIUM DIETS

No salt, soda, or baking powder should be used in preparing food.
. No salt should be added after the food is served. (No salt substitute should be used which contains sodium.)
. Water must have a low sodium content.
. Sodium bicarbonate or medicines containing it should not be taken.
. Omit prepared foods containing salt such as salad dressing, salty appetizers, salted nuts, potato chips, olives, pickles, relishes, bouillon cubes, and smoked or salted meats and fish.
. Omit canned foods unless canned without salt.
. Salad dressings must be made without salt.
. Unsalted cottage cheese is the only satisfactory cheese.
. Bread must be made without salt.
. Butter must be salt-free (sweet butter). Butter may be
shed free of salt.

The limits of a neutral diet range from a slightly acid ash through
utral to a slightly alkaline ash. The following three diets are
thin this range, the actual ash depending upon certain choices to
made by the patient. The general opinion is that if the diet is
utral it is not necessary to have an invariably slightly acid ash as
commended by Schemm because ammonium cloride or other
nilar acidifying drug is usually given in the treatment of congestive
lure and will readily alter a neutral or a slightly alkaline ash.
ith few exceptions the figures for the sodium content of the foods
these diets have been taken from the previously mentioned pub-
ation of the Research Laboratory of Mead Johnson and Co.

LOW SODIUM NEUTRAL ASH DIET

pproximately: C 207 P 50 F 50 Calories 1500; Sodium 0.5 gm.

Food items.	*Weight in gm.*	*Amount in common measure.*	*Sample menu.*
akfast:			
ruit juice	100	½ cup choose from list	Orange juice
eal with	30(dry wt.)	¾ cup, cooked	
Milk, whole	50 (¼ cup)	choose from list	Farina with milk
nsalted toast, white	30	1 slice	Unsalted white toast
weet butter	5	1 teaspoon	Sweet butter
everage, if desired		1 cup. Choose from list	Beverage
ight cream	30	2 tablespoons	Light cream
ugar	10	2 teaspoons	Sugar

Dinner			
Meat	50	1 serving. Choose from list	Sliced chicken
Potato or Potato substitute	100	1 serving. Choose from list	Rice
Vegetable	100	1 serving. Choose from list	Peas
Unsalted bread, white	30	1 slice	Unsalted white
Sweet butter	10	2 teaspoons	Sweet butter
Dessert	100	1 serving. Choose from list	Orange ice
Milk, whole	180	1 glass	Milk
Beverage, if desired		1 cup. Choose from list	Beverage
Sugar	5	1 teaspoon	Sugar
Lunch or Supper:			
Egg	48	1	Egg omelet
Vegetable	100	1 serving. Choose from list	Asparagus tips
Unsalted bread, white	30	1 slice	Unsalted white b
Sweet butter	10	2 teaspoons	Sweet butter
Fruit	100	1 serving. Choose from list	Applesauce
Milk, whole	180	1 glass	Milk
Beverage, if desired		1 cup. Choose from list	Beverage
Sugar	5	1 teaspoon	Sugar

Refer to—Directions For All Low Sodium Diets—previously listed.

Fruits and Fruit Juices—Cooked fruits only. Fruits must be cooked or can without sugar. Choose from the following list in the amount given:

Applesauce or apple juice—½ cup.
Orange, grapefruit or pineapple juice—½ cup.
Grapejuice or cranberry juice—⅓ cup.
Stewed peaches—1 medium size.
Stewed pears—1 medium size.
Prune juice—⅓ cup.
Stewed prunes—2 or 3.

Cereals—Must be prepared without salt. Use farina, rice, cream of whe oatmeal.

Beverages—Tea and coffee may be used if desired and not contraindicated. M from the allowance for Dinner and Supper may be added to the beverage if desired

Meat—Beef, veal, lamb, chicken.

Potato substitutes—Macaroni, spaghetti, rice, home made noodles.

Vegetables—May be fresh, frozen, or canned without salt and must be well cook Choose from the following list in the amount given:

Asparagus tips—5 or 6.
Peas—½ cup.
Potato (sweet or white)—one serving per day,—baked, boiled, or mashed.
Squash—½ cup.
Stewed tomato—½ cup.
String beans—½ cup.

Desserts—Plain fruit gelatine, fruit ices, or custard.

Eggs—May be soft cooked, poached, scrambled or as an omelet if salt is not u in the cooking.

1000 Calorie Low Sodium Neutral Ash Diet

Approximately: C 120 P 65 F 30 Sodium 0.5 gm.

Food items.	*Weight in gm.*	*Amount in common measure.*	*Sample menu.*
Breakfast:			
Fruit or juice	100	1 serving. Choose from list	Orange juice
Unsalted toast	30	1 slice	Unsalted toast
Sweet butter	3	½ teaspoon	Sweet butter
Egg	48	1	Egg
Beverage, if desired		1 cup. Choose from list	Beverage with
Skimmed milk	30	2 tablespoons	Skimmed milk

meat	75	1 serving. Choose from list	Roast beef
tables, two	100 each	1 serving of each. Choose from list	String beans Summer squash
lted bread	30	1 slice	Unsalted bread
t butter	5	1 teaspoon	Sweet butter
	100	1 serving. Choose from list	Melon
med milk	180	1 glass	Skimmed milk
rage, if desired		1 cup	Beverage
or Supper:			
meat	75	1 serving. Choose from list	Sliced chicken
etables, two	100, each	1 serving of each. Choose from list	Peas, sliced tomatoes
alted bread	30	1 slice	Unsalted bread
eet butter	5	1 teaspoon	Sweet butter
it	100	1 serving. Choose from list	Blueberries
mmed milk	180	1 glass	Skimmed milk
erage, if desired		1 cup. Choose from list	Beverage

fer to—Directions For All Low Sodium Diets—previously listed.

ad—White, whole wheat or rye bread made without salt. A Matzoth may be ituted for a slice of bread.

uits and Fruit Juices—Fresh, canned without sugar, or cooked without sugar. se from the following list in the amount given:

Apple—1 small or ⅓ cup of unsweetened juice.
Apricot—1.
Banana—½ medium size.
Grapefruit—½ or ⅓ cup of juice.
Grapes—10 to 12.
Grapejuice—⅓ cup.
Melon—4 heaping tablespoons of watermelon or ⅛ of a medium size cantaloupe.
Peach—1 medium size.
Pear—1 small.
Pineapple—1 slice or ½ cup of juice.
Orange—1 small or ⅓ cup of juice.
Raspberries, strawberries, blueberries, blackberries—½ cup.

everages—Tea and coffee may be used if desired and not contraindicated. Skim- milk from the allowance for Dinner and Supper may be added to the beverage esired.

Meat—Beef, veal, lamb, chicken.

egetables—Cooked or uncooked. May be fresh, frozen, or canned without salt. ose from the following list in the amount given.

Asparagus—5 or 6 stalks.
Celery—2 stalks.
Eggplant—⅓ cup.
Endive—10 leaves.
Chicory—10 leaves.
Lettuce—¼ head. Peas—½ cup. Squash—½ cup. String beans—½ cup.
Tomatoes—1 fresh or ½ cup of juice or stewed tomato.

ggs—May be soft cooked, poached, scrambled or as an omelet if salt is not used he cooking.

accharin—May be used as a sweetener.

0 Calorie Low Sodium Neutral Ash Diet (Table 29 p. 285)
Approximately: C 209 P 78 Sodium 0.5 gm

Food items.	*Weight in gm.*	*Amount in common measure.*	*Sample menu.*
kfast:			
ruit or juice	100	1 serving. Choose from list	Orange juice
ereal with	30(dry wt.)	¾ cup as served. Choose from list.	Oatmeal with
ilk, whole	50	½ cup	Milk

Breakfast (Contiued)			
Egg	48	1	Egg
Unsalted toast	30	1 slice	Unsalted toast
Sweet butter	5	1 teaspoon	Sweet butter
Beverage, if desired		1 cup. Choose from list	Beverage
Light cream	30	2 tablespoons	Light cream
Sugar	15	3 teaspoons	Sugar
Dinner:			
Meat	100	1 large serving. Choose from list.	Roast beef
Potato or potato substitute	100	1 serving. Choose from list.	Baked potato
Vegetables, two	100, each	1 serving of each. Choose from list.	String beans Summer squash
Unsalted bread	30	1 slice	Unsalted bread
Sweet butter	10	2 teaspoons	Sweet butter
Dessert	100	1 serving. Choose from list.	Lemon gelatin
Milk, whole	180	1 glass	Milk
Beverage, if desired		1 cup	Beverage
Sugar	5	1 teaspoon	Sugar
Lunch or Supper:			
Meat	75	1 serving. Choose from list	Sliced chicken
Rice or other cereal	30(dry wt.)	¾ cup as served. Choose from list.	Steamed rice
Vegetable	100	1 serving. Choose from list.	Asparagus
Unsalted bread	30	1 slice	Unsalted bread
Sweet butter	10	2 teaspoons	Sweet butter
Fruit	100	1 serving. Choose from list.	Peach
Milk, whole	180	1 glass	Milk, whole
Beverage, if desired		1 cup	Beverage
Sugar	5	1 teaspoon	Sugar

Refer to—Directions For All Low Sodium Diets—previously listed.

Bread—White, whole wheat or rye bread made without salt. A matzoth may substituted for a slice of bread.

Fruits and Fruit Juices—May be fresh, cooked or canned. Choose from following list in the amount given:

Apple—1 medium size or ½ cup of apple sauce or juice.
Apricots—2.
Banana—½ medium size.
Cherries—½ cup.
Cranberries—½ cup or ⅓ cup of juice.
Grapefruit—½ medium size or ½ cup of juice.
Grapes—10 to 12.
Grapejuice—⅓ cup.
Melon—4 heaping tablespoons of watermelon or ⅛ of a medium size cantaloupe
Orange—1 small or ½ cup of juice.
Peach—1 medium size.
Pear—1 medium size.
Pineapple—1 slice or ½ cup of juice.
Prunes—3 or 4 or ⅓ cup of juice.
Plums—3 or 4.
Raspberries—strawberries, blueberries, blackberries—½ cup.

Cereals—Must be prepared without salt. Use farina, rice, cream of wheat, oatme hominy, puffed rice, puffed wheat.

Beverages—Tea and coffee may be used if desired and not contraindicated. M from the allowance for Dinner and Supper may be added to the beverage if des

Meat—Beef, veal, lamb, chicken. Two eggs or a serving of unsalted cottage che may be substituted for meat once a day.

Potato substitutes—Macaroni, spaghetti, rice, corn, home-made noodles.

Vegetables—Cooked or uncooked. May be fresh, frozen, or canned without Choose from the following list in the amount given

ragus—5 or 6 stalks.
ry—2 stalks.
plant—½ cup.
dive—10 leaves.
rory—10 leaves.
tuce—¼ head.
shrooms—4.
s—½ cup.
tato (Sweet or white)—1 serving per day—baked, boiled, or mashed.
uash—½ cup.
ing beans—½ cup.
matoes—1 fresh or ½ cup of juice or stewed tomato.
—May be soft cooked, poached, scrambled or as an omelet if salt is not used
oking.
rts—Plain fruit gelatine; tapioca and cornstarch puddings (use milk allowance
day in their preparation); fruit as listed.

OBESITY.

JAMES J. SHORT, M.D.

scussion.—Fewer difficulties in the management of obesity would ncountered if one general principle would be kept in mind. uction of weight depends at all times on the maintenance of a ic deficit, *i. e.*, a difference between calories expended for heat energy and the caloric value of food ingested. This principle ies regardless of the type of obesity from which an individual rs. And there is no other principle by which excess fat can be

Despite the obviousness of this fact, one frequently sees ents being treated with every conceivable gland preparation and no clear conception of just what is to be accomplished. There owever, unlimited hope and faith, in the general belief that the logy must be "glandular." The idea seems to be prevalent that ome glandular product might be hit upon to correct some hypo- ical deficiency, the fat might suddenly "fold its tents like the bs and as silently steal away." Needless to say, this kind of apy is almost invariably disappointing. Failure to effect a satis- ory weight reduction often serves further to confirm many sicians in their belief that a given case of obesity is "glandular" therefore practically impossible to correct at the present stage ndocrine therapy. The patient is often permitted to feel that condition is hopelessly incurable, which occasionally leads to arranted pessimism and further recklessness in eating habits.

lthough the endocrines undoubtedly do influence the state of rition, they should nevertheless be regarded as *predisposing* but *determining* factors in the production of obesity. Obesity is sed by an excessive consumption of food beyond that essential he production of adequate heat and energy. In this sense all sity is "exogenous" in origin, for without the ingestion of an ss of food, no excess fat can be deposited, let the endocrine dis- bances be what they may. There is, therefore, no type of obesity ch is not amenable to dietary correction, frequent assertions to contrary notwithstanding. Dietary adjustment to produce a ric deficit is the *sine qua non* of successful treatment, even though ocrine therapy often may have a valid place in the program.

With these principles clearly in mind, and freed from the inhibi influence of many current false tenets concerning the problem weight reduction, the physician may undertake the managem of obesity with every expectation of success. A procedure w the writer has found successful over a period of years will be brie presented.

Procedure.—A general medical history covering present co plaints, hereditary disease, personal habits, past history, operatio etc., is carefully taken. Further information is then elicited regar ing the obesity itself, especially as to age of onset, its probable ca the usual diet, related symptoms and endocrine status. This is f lowed by a general physical examination with special attention the heart and circulation, hair distribution, fat deposits, habitus a weight, both actual and ideal. Ideal weight is calculated from improved life insurance table as shown in Table 33.

It will be noticed that the maximum age shown is thirty; there no sound physiologic reason for an individual to gain steadi during the remainder of his life. Ideal weight at age thirty shou be considered ideal for life. Three figures are given for each ag sex group, each relating to the bony framework, *e. g.*, medium (bold-face type), light and heavy. The class into which an ind vidual falls is determined by inspection of wrists, ankles, bread of shoulders and hips. Occasionally two people may disagree o this question, though a satisfactory estimate can usually be mad Interpolation is occasionally desirable. The table here given ha been found by the writer and his co-workers to be the most sati factory in their experience, and to agree closely with impressions what constitutes ideal weight at the close of the reduction period.

Following the physical examination (which includes fluoroscop of the chest) certain laboratory tests are made routinely and othe as indicated. Routine tests include urinalysis, serologic tests fo syphilis, blood urea nitrogen, cholesterol, sedimentation rate, re cell count and hemoglobin; basal metabolism and glucose toleran tests; if indicated, an electrocardiogram.

Metabolism.—The basal metabolism and glucose tolerance tes have proved especially helpful. Unduly low basal metabolic rate so often assumed to be the underlying factor in the etiology o obesity are occasionally found, but are not the rule. Indeed, th general trend is toward higher basal rates with increasing degre of obesity, though the great majority fall within normal limit Other helpful information which may be obtained from a carefull performed metabolism test (where the various steps are charted) the basal twenty-four-hour caloric expenditure and the total heat pro duction expressed as percentage of normal. If the patient's weigh has been stationary, it may be assumed that the daily basal calor expenditure as estimated plus 20 to 30 per cent is equivalent to th maintenance diet. This figure is reached by multiplying the tota basal calories per hour by 24 and adding at least 20 to 30 per cen for usual activity. Chart 5 gives the record of one extremely obes

Table 33.—Tables for Determining Ideal Weight. (Without shoes)

MEN

	In.	15 yr.	20 yr.	25 yr.	30 yr.
	0	98 **109** 123	107 **119** 134	112 **124** 140	115 **128** 144
	1	101 **112** 126	110 **122** 137	114 **126** 142	117 **130** 146
	2	103 **115** 129	112 **125** 141	116 **129** 145	120 **133** 150
	3	106 **118** 133	115 **128** 144	120 **133** 150	122 **136** 153
	4	110 **122** 137	119 **132** 149	123 **137** 154	126 **140** 158
	5	113 **126** 142	122 **136** 153	127 **141** 159	130 **144** 162
	6	117 **130** 146	126 **140** 158	130 **145** 163	133 **148** 167
5	7	121 **134** 151	130 **144** 162	134 **149** 168	137 **152** 171
5	8	124 **138** 155	133 **148** 167	138 **153** 172	140 **156** 176
5	9	128 **142** 160	137 **152** 171	141 **157** 177	145 **161** 181
5	10	132 **147** 165	140 **156** 176	146 **162** 182	150 **166** 187
5	11	137 **152** 171	145 **161** 181	150 **167** 188	155 **172** 194
6	0	141 **157** 177	149 **166** 187	156 **173** 195	160 **178** 200
6	1	146 **162** 182	154 **171** 192	161 **179** 201	166 **184** 207
6	2	150 **167** 188	158 **176** 198	166 **184** 207	171 **190** 214
6	3	155 **172** 194	163 **181** 204	170 **189** 213	176 **196** 221
6	4	159 **177** 199	168 **186** 209	175 **194** 218	181 **201** 226

WOMEN

Ft.	In.	15 yr.	20 yr.	25 yr.	30 yr.
4	8	93 **104** 117	98 **109** 113	101 **112** 126	104 **115** 129
4	9	95 **105** 118	100 **111** 125	103 **114** 128	105 **117** 132
4	10	95 **106** 119	102 **113** 127	104 **116** 131	107 **119** 134
4	11	97 **108** 122	103 **115** 129	106 **118** 133	109 **121** 136
5	0	100 **111** 125	106 **118** 133	108 **120** 135	111 **123** 138
5	1	103 **114** 128	109 **121** 136	111 **123** 138	114 **126** 142
5	2	105 **117** 132	112 **124** 140	114 **127** 143	116 **129** 145
5	3	108 **120** 135	114 **127** 143	117 **130** 146	120 **133** 150
5	4	112 **124** 140	117 **130** 146	120 **133** 150	122 **136** 153
5	5	115 **128** 144	121 **134** 151	123 **137** 154	126 **140** 158
5	6	119 **132** 149	124 **138** 155	127 **141** 159	130 **144** 162
5	7	122 **136** 153	128 **142** 160	130 **145** 163	134 **148** 167
5	8	126 **140** 158	131 **145** 163	134 **149** 168	137 **152** 171
5	9	130 **144** 162	134 **149** 168	138 **153** 172	140 **155** 174
5	10	134 **149** 168	139 **154** 173	140 **156** 176	143 **159** 179
5	11	139 **154** 173	143 **159** 180	144 **160** 180	148 **163** 184

ree Weights Given:
. Middle figures, dark, for medium build (medium bone weight for height). Average weight.
. Upper figures for slender build (light bone weight for height). 10 per cent reduction from average weight.
. Lower figures for large frame (heavy bone weight for height). 12½ per cent added to average weight.

individual weighing 487 pounds who required over 4000 cal per day to maintain weight, and who had a total heat produc of 113 per cent above normal. Using such information as a g it will be found that obese individuals are relatively heavy ea their protestations to the contrary notwithstanding.

CHART 5.—**Report on Basal Metabolism and Total Heat Produc**

Name..........*E. B.*.......... Date........ *1/24/39*....
Sex..*F*...Age..*45*...Height..*63½"*...Wght...*487* (Ideal..*147*)
Body Surface..*2.84* sq. m. (Ideal..*1.70*)..T...*98.0*..P...*80*..R...
Night's Rest..*Good*...Attitude..*Coöperative*..O_2 consumption.. *441*
per min...*26.44*..liters per hour. Total calories per hour..*126.90* (R
0.82. Heat value of O_2 -4.8 cal. per liter) (Average normal at weight..*59.50*)...Calories per sq.m. per hour..*44.68*.. (Average norm *35.0*)

RESULT { Basal Metabolic Rate is *27%*...*above*...the average norm
Total Heat Production...*113%*...*above*.. the average norm

Method—*Benedict-Roth*

Standard—*DuBois, Boothby-Sandiford*

Comment: Test: *Satisfactory*

The "total heat production" referred to is that produced un *basal* conditions. Its significance in connection with the "bas metabolism will be readily understood if it is remembered th "basal" metabolism refers to the heat production per *unit* (squa meter) of surface area, while total heat production refers to t body as a whole. Both figures are expressed as percentages abo or below an average "normal" for a person of the same sex and a In obtaining the percentage figure for total heat production, t figure for the total calories per hour, as determined by the test,

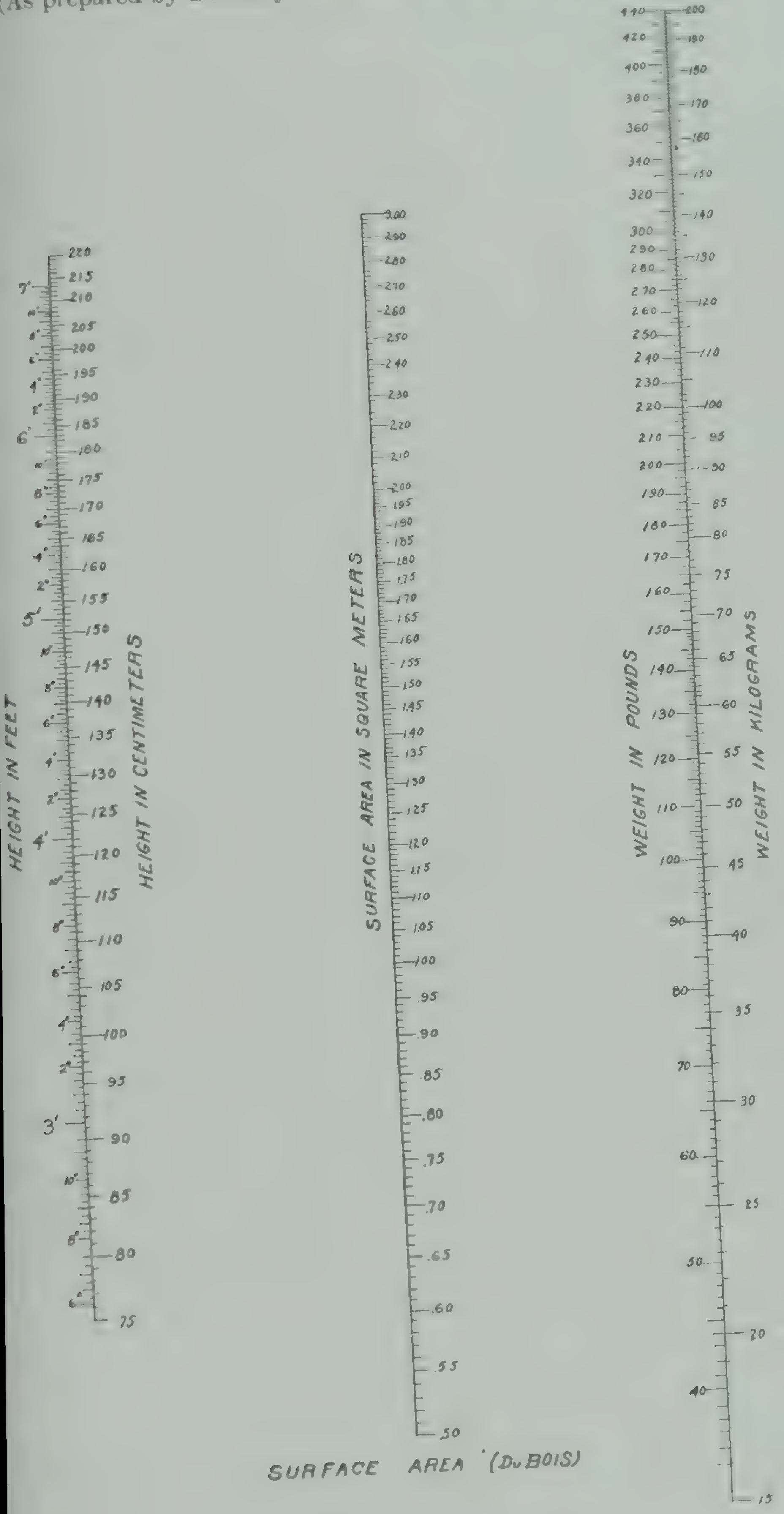
TABLE 34.—**The DuBois Normal Standards as Modified by Boothby and Sandiford.**

(From the Mayo Clinic) Prelim. Report: *Am. Jour. Physiol.*, **90**, 291, 1929.

(Calories per square meter per hour.)

Age.	Males.	Females.	Age.	Males.	Females.
5	(53.0)	(51.6)	20–24	41.0	36.9
6	52.7	50.7	25–29	40.3	36.6
7	52.0	49.3			
8	51.2	48.1	30–34	39.8	36.2
9	50.4	46.9	35–39	39.2	35.8
10	49.5	45.8	40–44	38.3	35.3
11	48.6	44.6	45–49	37.8	35.0
12	47.8	43.4			
13	47.1	42.0	50–54	37.2	34.5
14	46.2	41.0	55–59	36.6	34.1
15	45.3	39.6	60–64	36.0	33.8
16	44.7	38.5	65–69	35.3	33.4
17	43.7	37.4			
18	42.9	37.3	70–74	(34.8)	(32.8)
19	42.1	37.2	75–79	(34.2)	(32.3)

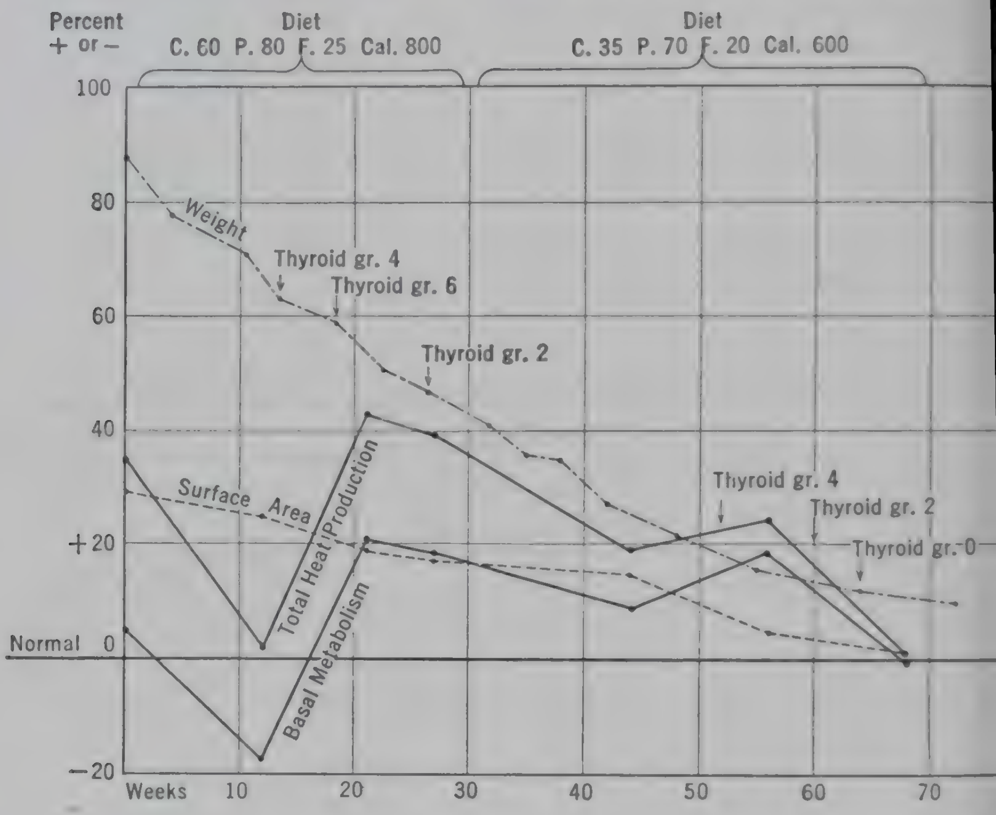
CHART 6.—**DuBois Body Surface Chart.**
(As prepared by Boothby and Sandiford of the Mayo Clinic)



divided by the normal number for the individual, *i. e.*, the th
retically correct figure at ideal weight. The latter figure ma
obtained by the use of Chart 6 and Table 34. Surface area at i
weight (in square meters) is multiplied by the correct numbe
calories per hour as found in Table 34.

The total heat production in obesity is almost invariably increa
above normal. As a gauge to metabolic activity it is a far be
guide than the "basal" metabolic rate as usually expressed. H
producing tissues (chiefly the muscles) must undergo more than do
their usual rate of energy exchange to produce a rate of +113
cent, as noted in Chart 5. Further metabolic stimulation, a

CHART 7.—**Effect of Low-caloric Diets and Thyroid Therapy on Weig Surface Area, Basal Metabolism and Total Heat Production.**



often employed by the use of thyroid extract, drugs, or other end
crine products might, and occasionally does, produce untoward
even disastrous consequences. The writer rarely employs metabo
stimulants at the beginning of treatment, but reserves their use f
a period subsequent to the employment of a reducing diet, when t
usual metabolic effect of a low-calorie diet has been obtaine
A characteristic response to a low-caloric diet is presented in Chart
It will be noted that shortly after the institution of a low-calor
diet the metabolic rate (expressed as basal metabolism and tot
heat production) dropped sharply to lower levels. Thyroid extra
was then given but the optimum dose was exceeded. In the writer
experience the patient can usually tolerate sufficient metabol
stimulation to keep the "basal" metabolism at the normal leve

than this will often elicit toxic symptoms. Unless such cor-n of the low metabolic rates obtained by reducing diets is patients frequently complain of lassitude and weakness, and eight loss becomes unsatisfactory. Thyroid extract is gener-mployed for this purpose and is very satisfactory. The dosage be suited to the individual case and should be controlled by al observation and a sufficient number of metabolic rate deter-tions to gauge the degree of response. Three to 4 grains daily siccated thyroid extract is rarely exceeded in the writer's ience.

iabetes.—When the glucose tolerance test indicates diabetes, ondition can usually be disregarded while the obesity is under ment. In other words, complete correction of the obesity is lent for the diabetes. Even in long-standing cases of diabetes, in is seldom necessary during the reduction period. A number ses which by all acceptable criteria, such as high blood sugars marked glycosuria, could be considered diabetic, have been rved to regain a strictly normal glucose tolerance after thorough ht reduction. Milder degrees of glucose tolerance impairment uently seen are almost invariably corrected.

he Psychic Factor.—One aspect of obesity management which erves special emphasis is the psychic factor. Without the pa-t's coöperation treatment is doomed to failure. Obese individ-have often developed food habits which when left to themselves have not the will power to break. The physician must supply will power, instill the necessary confidence, encourage the ient, and act as guide and "father confessor." A goal is an ellent device for this purpose. The writer has established as a goal eight loss of 10 pounds per month which is reasonable and about general average. Thus, to point out a definite period, say of ten nths for the removal of 100 pounds, will frequently develop ater faithfulness in adhering to the program. Many patients e great delight in exceeding predictions, though this must some-es be discouraged if essential foods are being omitted from the ary. One patient, under the writer's care, by a very strict erence to her diet reduced her weight by 283 pounds in thirteen nths, instead of in twenty months as originally predicted; even er health improved steadily.

ledical Supervision.—To accomplish large weight losses it is ntial that the patient report to the physician at regular intervals. optimal frequency, in the writer's experience, has been at weekly rvals. A request for a list of all foods consumed during this od is a further check on dietary indiscretions or errors of rance.

Diets.—Diets should be individualized. Although one general may suit well the needs of a majority of patients, greater coöp-ion may be obtained if idiosyncrasies of taste and constitution consulted. The psychic effect of a special, individualized diet should not be overlooked. However, general principles to be owed are much the same for all patients.

Diets of from 600 to 1000 calories have been found most succe[ssful] for the average city dweller, in the writer's experience. Me[asured] diets are most practical for ambulatory patients. For institu[tional]ized cases, weighed diets are to be preferred. Diets of hig[her] caloric value should be prescribed for the grosser cases of ov[er]weight, with modification downward as progress is made.

In calculating a diet for any given case, it is important that prot[ein] and carbohydrate be adequate and that fat be kept low. An al[to]gether fat-free diet is apt to be somewhat unpalatable as well [as] difficult to obtain. Minerals and vitamins should be abunda[nt]. Since these are often inadequate in restricted diets it is well to a[dd] both. A mixture of the essential mineral elements with sodi[um] chloride is on the market for table use.* Vitamin concentrates [in] capsule form are readily available.

In the calculation of protein and carbohydrate values, the *id[eal]* weight should be utilized. One gram of protein per kilogra[m] (2.2 pounds) of ideal weight is adequate. The carbohydrate conte[nt] should not be less than 0.6 gram per kilogram and can usually [be] equal to the protein. Carbohydrates have a protein-sparing acti[on] upon body tissue. Fats need not be added as such.

Rapidly accumulating data on vitamin requirements and distrib[u]tion indicate that deficiencies frequently exist in average dietari[es]. Especially is there evidence for a deficiency of vitamin B_1 or thiam[ine], largely as a result of the prevailing tendency toward the use [of] highly milled flours in baking. Other fractions of the vitamin [B] complex, such as riboflavin and niacin, are also frequently d[e]ficient. Since reducing diets contain only from one-half to on[e-]third the caloric value of a maintenance diet, still greater deficienc[ies] may be expected. The diets offered in this section have been es[ti]mated to contain adequate amounts of the vitamins except thiami[ne]. The writer has long made it a practice to add to the daily diets [of] private patients commercial concentrates of the vitamin B com[]plex. The adult requirement of B_1 which is approximately 500 I.[U.] or 1.5 mg., should be assured. The great disadvantage is that t[he] cost of such products is relatively high and may entail a hardsh[ip] to those in the lower income brackets, such as is the case wi[th] clinic patients. A lower-priced product is obtainable in the for[m] of brewer's yeast.

As wide a latitude in choice of foods as is feasible is great[ly] appreciated by most patients. Typical diets which have be[en] found useful are as follows:

Low-caloric Diet.

Approximately 600 Calories.

Breakfast:

Fresh Fruit in Season: *One serving of:* apple, blackberries, grapefr[uit,] melon, orange, peach, pineapple, raspberries, strawberries

Milk: One-quarter cup

with

Beverage: Coffee, tea, *Postum*

* Titro salt, Nordmark Company, New York.

and Supper:
t *or* Fish: One-quarter pound lean meat or fresh fish, boiled, broiled, baked; *NO* gravy
: Two, boiled or poached
se: One-quarter pound cottage or pot
etables: *As desired:* asparagus, string beans, beet greens, broccoli, cabbage, carrots, cauliflower, celery, celery cabbage, chicory, cucumbers, escarole, eggplant, lettuce, radishes, spinach, squash, tomatoes, tomato juice, turnips, beets, Brussels sprouts, onions, canned peas
k: One cup of skim milk or buttermilk
erage: Coffee, tea, *Postum, Sanka*
lt in moderation. Vinegar or lemon may be used with salads

Sample Menu.

fast
-half grapefruit
fee with one-quarter cup milk
eon:
ge portion of spinach with
o poached eggs
tuce and tomato salad
e cup buttermilk
r:
e slice lean roast beef
rge portion of string beans
rge portion of celery hearts and radishes
ffee
me:
e cup skim milk or buttermilk

Low-caloric Diet.

Approximately 800 Calories.

kfast:
esh Fruit in Season: *One serving of:* apple, blackberries, grapefruit, melon, orange, peach, pineapple, raspberries, strawberries
ilk: One-quarter cup
with
everage: Coffee, tea, *Postum, Sanka*
h and Supper:
eat *or* Fish: One-quarter pound lean meat or fresh fish, boiled, broiled, baked; *NO* gravy
or
gs: Two, boiled or poached
or
eese: One-quarter pound cottage or pot
getables: *As desired:* asparagus, string beans, beet greens, broccoli, cabbage, carrots, cauliflower, celery, celery cabbage, chicory, cucumbers, escarole, eggplant, lettuce, radishes, spinach, squash, tomatoes, tomato juice, turnips, beets, Brussels sprouts, onions, canned peas
esh Fruit in Season: *One serving of:* apple, blackberries, grapefruit, melon, orange, peach, pineapple, raspberries, strawberries
lk: One cup of milk or buttermilk
verage: Coffee, tea, *Postum, Sanka*
alt in moderation. Vinegar or lemon may be used with salads.

Sample Menu:

kfast:
e sliced orange
ffee with one-quarter cup milk

Luncheon:

Tomato Soup: one cup milk heated with tomato purée
Salad Plate: one-quarter pound cottage cheese, grated raw
watercress
Apple
Tea with lemon

Dinner:

Broiled filet of haddock
Beets with vinegar
Shredded raw cabbage with lemon juice
One-half grapefruit
Coffee

Bedtime:

One cup milk or buttermilk

Low-caloric Diet.

Approximately 1000 Calories

Breakfast:

Fresh Fruit in Season: *One serving of:* apple, blackberries, grapefr
melon, orange, peach, pineapple, raspberries, strawberries
Bread: One slice whole wheat
Butter: One level teaspoon
Milk: One-quarter cup
with
Beverage: Coffee, tea, *Postum, Sanka*

Lunch and Supper:

Meat *or* Fish: One-quarter pound lean meat or fresh fish, boiled, broi
baked; *NO* gravy
or
Eggs: Two, boiled or poached
or
Cheese: One-quarter pound cottage or pot
Vegetables: *As desired:* asparagus, string beans, beet greens, broc
cabbage, carrots, cauliflower, celery, celery cabbage, chicory, cuc
bers, escarole, eggplant, lettuce, radishes, spinach, squash, tomat
tomato juice, turnips, beets, Brussels sprouts, onions, canned p
Fresh Fruit in Season: *One serving of:* apple, blackberries, grapefr
melon, orange, peach, pineapple, raspberries, strawberries
Milk: One cup of milk or buttermilk
Beverage: Coffee, tea, *Postum, Sanka*

Use salt in moderation. Vinegar or lemon may be used with salads.

Sample Menu.

Breakfast:

Juice of one orange
One slice of whole wheat toast with
One teaspoon butter
Coffee with one-quarter cup of milk

Luncheon:

Broiled beef cake
Steamed carrots
Large salad of mixed greens with vinegar
One slice of pineapple, cubed
One cup of buttermilk

ato juice
roast lamb
ied peas
e salad of lettuce and cucumbers
le
ee
:
cup skim milk or buttermilk

arrangement shown* on the Form for Office Use has proved satisfactory. It not only permits variations to be made to ach patient's individual preferences and needs, but also allows er adjustments as progress is made. Intermediate feedings of aloric foods have been found extremely helpful in preventing ntrollable hunger with consequent overeating at the next reg- meal.

Form for Office Use.

AL DIET FOR____________________

________Initial Weight________Age________

Required Daily:
. MILK (Skim or Buttermilk)______2. EGGS (Not fried)______
. CHEESE________4. MEAT OR FISH______
. VEGETABLES________
. FRUIT________
. BEVERAGES________
. BREAD________9. BUTTER______
. CEREALS________
. MINERALS________12. VITAMINS______
. FLUIDS________
. ________
. ________

ngement of diet optional. Only three meals daily.

ested Arrangement (*Must conform to above requirements*):

kfast:
t, 1 portion
milk or butter-
ilk, 1 glass
erage

Luncheon:
Meat or Fish or Eggs
Vegetables
Salad
Skim milk or butter-milk, 1 glass
Beverage, 1 cup

Dinner:
Consommé or Soup (See Food List)
Meat or Fish or Eggs
Vegetables
Salad
Cottage cheese
Skim milk or buttermilk, 1 glass
Beverage, 1 cup
Dessert: Fruit or Jello

morning and Midafternoon:
ss tomato juice *or*
ss buttermilk *or*
1 glass skim milk *or*
1 cup tea with 1 cracker

General arrangement of this diet was suggested to the writer by Dr. E. B. nin of Dallas, Texas.

Food List.

Vegetables:

Group I
Asparagus
Beans, string
Brussels sprouts
Cabbage
Cauliflower
Celery
Cucumber
Endive
Fennel
Greens, all kinds
Kohlrabi
Leeks
Lettuce
Mushrooms
Okra
Radishes
Sauerkraut
Squash
Tomatoes

Group II
Beets
Carrots
Onions
Pimentos
Pumpkin
Turnips, all kinds

Group III
Artichokes, French
Artichokes, Jerusale
Corn
Parsnips
Peas
Salsify (oyster plant

Meats and Fish: (Lean portions only; boiled, broiled or roasted, but fried.

Beef
Fowl, all kinds
Lamb
Veal
Bass, all kinds
Bluefish
Codfish, fresh
Codfish, salt
Flounder
Haddock
Halibut
Perch, yellow
Pollock
Porgy
Shad roe
Smelt
Trout
Weakfish
Whitefish

Fruits:

Canned (all water-packed):

Apricots	4 halves	Peaches	2 halves
Bartlett pears	3 halves	Pineapple juice	½ glass
Grapefruit	½ glass	Plums	2 whole
Grapefruit juice	½ glass	Prunes	2 whole

Fresh or Frozen:

Apple	1 half	Orange juice	½ glass
Berries (any kind)	⅔ glass	Peaches	1 medium
Cantaloupe	½ small	Pineapple	1 slice
Grapefruit	1 half	Tomato juice	½ glass
Grapefruit juice	½ glass	Watermelon	1 small slice
Oranges	1 small		

Condiments and Accessories: (May be eaten as desired.)

Salad dressings prepared with mineral oil.
Vinegar, lemon juice, garlic, paprika, mustard, horseradish, pickles, etc.
Lister's Golden Spread (butter substitute).
Bouillon cubes.
Consommé or clear vegetable soup.
Gelatin desserts.

It may readily be seen from the foregoing that numerous fo combinations can be devised. Enough has been said to indicate t general procedure which, if followed, will invariably bring succe It goes without saying that cases of endocrinopathy with obesi must receive special care as indicated *in addition to* dietary mea ures; but at the same time treatment of an endocrine imbalan *does not supplant dietary measures* for an associated obesity.

NOTE.—In prescribing any diet for obesity, constant wat should be instituted for the appearance of hypoglycemia which not of infrequent occurrence. (See page 317.)

ORAL CONDITIONS AND DISEASES.

IRVING A. SWANSON, D.M.D.

ıeral Considerations. The view, long held, of dentistry con-
ıng a separate entity of medicine has added needless confusion
complexity already entailed in reaching a diagnosis on related
oms. Today, a tooth, a finger, and a toe are known to be as
related, and to contribute as much to the condition of the
, as any other organ in the body. Scientific approach to the
ı of a tooth cannot differ from any other medical procedure
ing nutrition or a specialized knowledge of dietetics. To
entiate the normal from the abnormal dental condition, all
ıble medical history and additional dietary information, includ-
ınctional habits, must be recorded in detail.

rmal Dental Structures.—To understand the nutrition of teeth
he investing tissues, a knowledge of their anatomical and chemi-
ımpositions is essential.

amel.—The outermost and visible structure of a tooth, the
est structure in the body, is composed of about 4 per cent of
ic keratin, a trace of calcium fluoride, and inorganic salts,
7 per cent, viz.:

	Per cent.
Calcium phosphate	89.82
Calcium carbonate	4.37
Magnesium phosphate	1.34
Other salts	0.88

istologically, the inorganic substance represents hexagonal
ns or rods cemented by the limited organic substance which
e observers maintain permits functional diffusion of substances
lution for nourishment. The enamel depends for its formation
meloblastic cells which govern calcification and deposition.

entine.—It directly underlies the enamel and the cementum of
root. Dentine development depends upon odontoblastic cells
h act in building and calcifying dentine similar to osteoblasts in
building of bone. It is composed of 28 per cent organic matter
agen plus elastin), 10 per cent water, and inorganic salts, 62
ent, viz.:

	Per cent.
Calcium phosphate	47.0
Calcium carbonate	6.5
Calcium fluoride	2.5
Magnesium phosphate	2.0
Sodium salts	4.0

entine contains living protoplasm and tubules through which
tooth is abundantly supplied with nutrition from the innermost
cture, the pulp. Whether the enamel is also supplied with
ition is still a matter of conjecture.

Cementum.—The root or invisible portion of the tooth is cov by a substance similar to bone, and by the aid of pericem tissue fibers connects the tooth to the surrounding, supporting a lar bone where it receives its nutrition.

Pulp.—The nutritive supply to the dentine and possibly enamel comprises an arteriole, venule, and nerve, becoming a ca lary network supported in vascular connective tissue. These ves are branches of the larger vessels in the jaw bone and gain entra to the tooth chamber through the apical foramen.

Pericementum and Gingival Tissue.—The cementum of the r is directly connected with a fibrous elastic tissue which clo resembles periosteum and which is nourished by the main vascu supply, derived from narrow spaces bordering the alveolar bone which its attachment is maintained. Thus a tooth is nourish after the pulp has been removed or becomes diseased.

Alveolar Bone or Process.—This consists of an osseous structu developed on the bodies of the maxilla and mandible for the purp of supporting the teeth. This bone consists of a peripheral plate compact bone under which is cancellated osseous tissue. In depr sions or alveoli, this bone supports the tooth roots. It is lined by peridental membrane which gives protection and nourishme being continuous with the peripheral periosteum. After tooth l this bone has no further function, and undergoes resorption.

Mandible and Maxilla.—These resemble other osseous tissues the body. Bone is a connective tissue in which the intercellu substance has undergone calcification. It is composed of orga and inorganic substances.

Organic Substances:

Connective tissue, cells, intercellular substance, blood vesse nerves, bone-marrow.

Inorganic Substance:	*Per Cent.*
Calcium phosphate	51.0
Calcium carbonate	11.0
Calcium fluoride	2.0
Magnesium phosphate	1.0
Sodium chloride	1.0

Chronology of Human Dentition

To understand clearly at what periods in life nutrition of t dental structure should be controlled by diet, a knowledge of t embryonic formation, eruption and calcification periods must known. The following tabulation is after Rudolph Kronfeld, 19 from Brennemann.

Embryonic Development.

1. *Deciduous Dentition:* (Enamel organs for the 20 deciduous teeth a present in the 2½ months' embryo.)
   First evidence of the calcification of crowns:
   Central incisor . . . . 5 months *in utero*

..us Dentition.—(Continued)

Lateral incisor	5 months *in utero*
First molar	5 months *in utero*
Cuspids	6 months *in utero*
Second molars	6 months *in utero*

..manent Dentition:

..namel organs for the permanent dentition are first present:

First molars	17 weeks	Embryonic Period
Incisors	24 weeks	
Cuspids	25 weeks	
First premolars	29 weeks	
Second premolars	33 weeks	
Second molars	6 months after birth	
Third molars (wisdom teeth)	5 years after birth	

Calcification of Crowns.

Lower jaw	*First evidence*	*Completed*
First molars	9 months	$2\frac{1}{2}$–3 years
Central incisor	3–4 months	4–5 years
Lateral incisor	3–4 months	4–5 years
Cuspid	4–5 months	6–7 years
First premolar	$1\frac{3}{4}$–2 years	5–6 years
Second premolar	$2\frac{1}{4}$–$2\frac{1}{2}$ years	6–7 years
Second molar	$2\frac{1}{2}$–3 years	7–8 years
Third molar	8–10 years	12–16 years
Upper jaw		
First molar	9 months	$2\frac{1}{2}$–3 years
Central incisor	3–4 months	4–5 years
Cuspid	4–5 months	6–7 years
Lateral incisor	1 year	4–5 years
First premolar	$1\frac{1}{2}$–$1\frac{3}{4}$ years	5–6 years
Second premolar	2–$2\frac{1}{4}$ years	6–7 years
Second molar	$2\frac{1}{2}$–3 years	7–8 years
Third molar	7–9 years	12–16 years

Tooth Eruption.

Deciduous Dentition:

Central incisors, mandibular	6–8th month
Central incisors, maxillary	8–10th month
Lateral incisors, maxillary	8–10th month
Lateral incisors, mandibular	12–14th month
First molars, maxillary and mandibular	12–16th month
Canines, maxillary and mandibular	16–20th month
Second molars, maxillary and mandibular	20–30th month

Permanent Dentition:

Lower jaw	
First molars	6–7 years
Central incisor	6–7 years
Lateral incisor	7–8 years
First premolars	10–12 years
Canine	10–11 years
Second premolars	11–12 years
Second molar	12–13 years
Third molar	17–30 years

Tooth Eruption.—*(Continued)*

Upper jaw	
First molar	6–7 years
Central incisor	7–8 years
Lateral incisor	8–9 years
First premolar	10–11 years
Canine	11–12 years
Second premolar	10–12 years
Second molar	12–14 years
Third molar	17–30 years

Root Calcification Periods. The eruption periods indicate the beginni[ng of] root calcification.

Deciduous	*Completed*
Central incisor	1½–2 years
Lateral incisor	1½–2 years
Canine	2½–3 years
First molar	2–2½ years
Second molar	3 years
Permanent—Lower jaw	
Central incisor	9 years
First molar	9–10 years
Lateral incisor	10 years
First premolar	12–13 years
Canine	12–14 years
Second premolar	13–14 years
Second molar	14–15 years
Third molar	18–25 years
Permanent—Upper jaw	
First molar	9–10 years
Central incisor	10 years
Lateral incisor	11 years
First premolar	12–13 years
Canine	13–15 years
Second premolar	12–14 years
Second molar	14–16 years
Third molar	18-25 years

Environmental and Racial Influences.—Diet is a pot-pourri of the foods of the world. Most countries are celebrated for one more distinguishing features of their culinary art. Foods are in-herited or borrowed from almost every quarter of the globe. T instability inherent in this practice has resulted in a poisoning of t digestive systems not immune to tissue abuse.

Subsisting on foods natural to the climate and area, man is su-plied with teeth and investing bone tissue rarely corrupted by t rigors of a restricted diet. Tooth decay usually followed the impo-tation of strange, exotic foods and the habits of civilization.

Inheritance and Endocrine Factors.—Nature never permits inhe-tance of diseased tissue, but man, through abuses in diet and habi does hand down to his offspring poorly nourished and underdev-oped tissue. Dental tissue can never be rebuilt. After the develo-mental period of growth, it retains its initial formation and can nourished only to the extent of preventing further destruction, a the strengthening of that tissue already formed.

y conditions exist in the mother, the fetus and the embryo determine the health of the teeth in the unborn child. Among st confusing and perhaps those playing the most important e the glandular disturbances which require the individual on of the physician and dentist alike. Due to the limited dge and obscurity of diagnosis, many glandular irregularities cate an otherwise dietary problem.

glands, intimately associated with calcium metabolism, our attention because tooth and bone growth are dependent he normal calcium balance of the individual.

re exists in the body a very efficient mechanism for calcium osphorus regulation, dominated as to fixation by vitamin D, to mobilization by the parathyroid glands.

er glands in the body, such as the thyroid, the pituitary and ductless glands, will likewise manifest irregularities in metab- and nutrition.

tal Abnormalities Due to Glandular Irregularities.—Dyspitui- (Acromegaly). Among other symptoms this dysfunction nts an enlargement of the head and jaws with the ultimate tion of the dental arches separating the teeth and prohibiting al function.

pothyroidism (Myxedema).—Dryness of the mucous mem- es accompanies the skin dryness manifested in this adult dis- Salivation is diminished, the teeth loosen and fall out.

retinism).—A congenital and hereditary dwarfism with an rdeveloped head and jaw bones (osteopathyrosis), with spongy ding gums and loosening of the teeth. Eruption of the teeth etimes never occurs and is always greatly retarded. When tion does occur, the teeth are only partially retained.

ypoparathyroidism (Tetany).—Control of the utilization of um salts is interfered with. Diseases in this gland result in rupted development and poorly calcified teeth and jaw bones.

order to proceed systematically on any dental dietary problem, orough medical report on the metabolism and glandular func- of the individual must be recorded and irregularities arrested.

Causes of Tooth Decay.

any theories have been advanced as to the specific causes of h decay. As we sum up the evidence which has accumulated been presented at different intervals, it is obvious that all must onsidered.

The Miller Theory (Chemico-parasitic).—Food and plaque ched to the crown of a tooth undergoes fermentation by the on of bacteria and their proteolytic enzymes. Dilute acids form h etch the enamel and decalcification occurs, allowing the ance of bacteria to the organic dentine which undergoes solution.

. The Nutritional Theory.—As early as the period of Galen, h decay was described as a "complex nutritional disturbance." ay this theory has been supported and demonstrated by Howe, ker, the Mellanbys, Windaus, Hess, Hanke and others.

III. The Hydrogen Ion Theory. The inorganic substance tooth may be altered by a replacement of hydroxyl groups certain ions such as fluorides, other halides and perhaps carb ions.

Calcium and Phosphorus Requirements.

Calcium.—The amount of calcium in the normal adult b should be 1.45 per cent of the body weight. Ninety-nine per of this is in the bones and teeth. At least 1.0 gram of calciu necessary in the daily diet for every 100 grams of protein. Du pregnancy and lactation this should be increased.

Phosphorus.—The average minimal requirement for phosph for a 70-kg. adult is 0.88 gram per day (2 grams as P_2O_5) or 1 20 mg. per kg. One-fortieth to one-fiftieth as much phosphoru required in the diet as protein.

Children should ingest 1.2 to 1.5 grams of phosphorus per kg. 9 to 11 mg. per cm. of height.

The minimum requirement of calcium and phosphorus as ad cated by LaMer is:

For the adult	0.68 gram Ca 1.32 gram P
For children	Twice the amount
For lactating and For pregnant women	Three times the amount

Refer also to page 116.

Before a woman gives thought to having a child, she should fi ascertain by a complete medical examination that her body is normal healthy condition. A diet proper for her is absolute necessary for the demands which Nature will make upon her mine salt reserve during pregnancy.

On the assumption that no disease or abnormal condition comp cates the considerations, there are four important factors whi govern a normal diet from the standpoint of developing normal too structures, viz.:

I. Amount of ingested salts.
II. Sunlight, artificial or natural.
III. Glandular activity.
IV. Vitamins C and D.

A deficiency in any of the vitally needed substances known vitamins results in local and systemic manifestations. Lack proper vitamin nutrition is apparent by specific indications in t teeth and oral cavity.

Most experimentation has been conducted on animals. Resul suggest that reactions would be similar in man. After caref observation, such has proved to be the case with little variatio Eddy has shown that 3 cc. of orange juice per day is required by

nd guinea-pig to insure freedom from changes in the pulps of eth. If we assume that man and the guinea-pig are equally tible to a vitamin C deficiency, a 150-pound man would e 450 cc. (1 pint) of orange juice a day. This is the amount lanke and others have empirically determined to be adequate.

ults from a Deficiency of Vitamin A.—The odontoblastic cells dentine lose their specialized function and revert to osteo- characteristics which result in lessened calcification. Teeth s nature are known as the malacotic or soft teeth because of w percentage of mineral matter. Osteoblasts are not affected is deficiency which points out that only specialization tissue functional period is inhibited.

lbach has interpreted the pathology in experimental animals. dular and duct epithelium in salivary glands is replaced by ified, keratinized desquamating epithelium and the saliva is ged. The sinuses and glands at the base of the tongue become ptible to pus-forming organisms.

cording to Bessey and Wolbach (1938) "in all probability, Vita- A deficiency during the formative period of teeth outranks in human being all other vitamin deficiencies in importance."

esults from a Deficiency of Vitamin B_1.—There is an impairment ppetite and digestion, lessening the salivary secretions. Nervous rders are increased, teeth do not respond to normal reflexes, lized nerve supply and tissue tone are upset by the loss of normal rvation.

Results from a Deficiency of Vitamin C.—Osteoporosis is produced the teeth exactly as is seen in cases of lack of calcium or after noving the parathyroids. The pulps of the teeth become necrosed, eolar bone fragile, the gums swollen and red, predisposing pyor- a with a tendency to hemorrhage and bleeding gums.

Results from a Deficiency of Vitamin D.—Muscular and skeletal akness, underdeveloped malformed jaws, crowded teeth, caries l susceptibility to nose, throat and mouth infections. In complete ence, infantile tetany, rickets and osteomalacia with very acute l destructive changes in the teeth and investing tissues. Vitamin is a general catalytic vitamin when acting with calcium, phos- orus and the other vitamins.

Results from a Deficiency of Vitamin E.—The sex organs play an portant rôle in the development of body growth and function, ecially in the male. Lack of vitamin E lessens the development facial characteristics, jaw bones and muscles of mastication.

Results from a Deficiency of Vitamin G.—Inflammatory stomatitic ections of the mouth and loss of appetite and salivary stimulation.

The Normal Diet for Proper Dentition.

What should the diet consist of? This has been the question con- nting the medical and dental professions year after year, with ceptance today and rejection tomorrow. There are six fundamental nciples essential to the healthy individual's diet, viz.:

I. The food must be palatable, available and suited to
dietary habits of the individual.

II. There should be an abundant supply of vitamins. Refer
page 48.

III. Proteins adequate for growth and maintenance are neces
Refer to page 106.

IV. The diet must contain fuel (Calories) sufficient to main
the normal weight. Refer to page 101.

V. There must be sufficient mineral salts for the needs of
body. Refer to pages 113 and 144.

VI. Bulk or residue is essential to satisfy the desire for subst
tial amounts and to stimulate normal bowel function.

Investigation by research workers has led to a wide difference opinions as to the quantity of vitamins needed by individua Therefore, these levels have been raised higher and higher in ord to satisfy the belief that the individual needs more than "j enough." In addition, the mineral requirements have suffered t same fate so that the diets are supplemented by additional dica cium phosphate, about 2 grams daily.

Periods of Tooth Nutrition.

The development and nutrition of a tooth must be considere from the changes occurring in five important periods.

I. The mother's health before conception.
II. The prenatal (embryonic) period.
III. Infancy, suckling to age six.
IV. Childhood to fifteen years.
V. Early youth to maturity.

I. *The Mother.*—Every woman has at some time during her perio of pregnancy wished that her health before conception had bee better. That weakening period when she is called upon to give a her effort and strength is far too late in the game that Nature plays to go back and strengthen her reserve of mineral salts. "For ever child a tooth" as the price that the mother pays, is not far from th truth when we analyze gram for gram what goes into the diet an what is expected to be built from it. What foods should th expectant mother choose? Refer to page 412.

Typical High-calcium Menu.

Sample Menu.

Breakfast:

Fruit
Whole grain cereal with milk and sugar
Egg, except fried
Whole grain toast *or* roll with butter
Milk *or* hot milk flavored with coffee and sugar

Typical High-calcium Menu.—(*Continued.*)

on:

ım of vegetable soup
s *or* cheese
ked vegetables
d with dressing
ole grain bread with butter
sh or stewed fruit
k

r:

at *or* fish
ato
oked vegetable
ad with dressing
hole grain bread with butter
nple pudding *or* cheese and whole grain crackers
lk or cocoa

ime:

ıttermilk *or* milk

. Pre-natal (Embryonic) Period.

his is the important period for the formation of the primary ition, beginning at two and one-half months, and the permanent ition at 17 weeks on to birth. The pregnant woman should st 2 grams of calcium daily. If the mother can maintain her nal calcium metabolism in balance, calculations show an in- sed demand in the second half of pregnancy of 20 per cent for developing embryo. Insufficiency of the intake or increase of output of calcium must provoke a calcium imbalance. During gnancy the insufficiency occurs physiologically during the period rowth. Increased output occurs during lactation.

ietary Changes During Normal Pregnancy:

Calories	400 increase over normal
Protein	75 to 100 grams daily

here the first period has had insufficient mineral salts, it is cus- ary to supplement this diet with concentrated calcium and phos- rus salts, such as the lactate, gluconate, or dicalcium phosphate, to 2 grams daily.

efer elsewhere for a suggested diet.

II. Period of Infancy, Suckling to Age Six.

he new-born infant possesses 27 grams of calcium, that is, 1.0 per t of its weight in comparison to the adult, 1.5 per cent. The suck- increases the first month about 30 grams daily: 0.27 gram of ium corresponds to this increase in weight. The mother's milk

contains 0.03 per cent of calcium. The suckling should get the
35 ounces of milk. This is not the case, the child being in ca
imbalance in the first period of lactation. As growth becomes sl
the calcium in the mother's milk is sufficient. When cow's m
given with little if any maternal milk, an extra supply of calci
not indicated. This is the period when calcium-insufficiency
occur frequently in the mother. Normal breast feeding should al
be the choice unless the health of the mother contraindicates.
growth of face, jaws and muscles of mastication are directly dep
ent on the normal exercise of breast feeding. Nature is not wr
if her teaching and natural impulses guide us to normal feed
Man makes the mistake of changing the elementary rules and
health of the offspring suffers.

IV. Period of Childhood to Fifteen Years.

During this time any deficiency in the earlier periods will
manifested. This period will register forever on the perman
teeth. Rickets will appear to show faulty calcium metaboli
By continuing the chain of mineral salt nutrition in this period
observing an excess in calcium balance, the erupting teeth
certain to be properly nourished.

New experimentation indicates that fluorine in the drinking wa
amounting to 1 P.P.M. (part per million), sufficient to cause onl
mild fluorosis or slightly less, will prevent dental caries.

A vast amount of experimentation involving a national survey
soil and drinking water with analysis for fluorine will be necess
before conclusive evidence is obtained.

It is interesting to note that in areas where fluorine content
high and caries incidence low, the content of calcium and ph
phorus in the soil is also high.

Diet for Adolescence.

1 qt. milk, minimum
1 or 2 eggs
1 serving meat, fish or liver
2 vegetables high in calcium, such as broccoli, cauliflower, ka
  watercress, endive, turnip greens
1 orange, apple, or tomato
1 additional fruit
1 teaspoon cod-liver oil
6 teaspoons butter
Ice-cream, chocolate, figs, almonds, filberts, and citron.

V. Period of Early Youth to Maturity.

This is the time that all the foundation of mineralization w
be taxed to its full extent. Students are not closely observed. Th
adopt habits and dietary schemes of their own choosing with i
proper care with the tooth brush and mouth hygiene. If this peri
passes without a breakdown and the value of the completed dent
arches can be impressed upon the individual, no further dent

les should occur in life, on the assumption that other systemic conditions continue and a sustaining diet be maintained. normal diet during this period is of more importance than any alized selected diet for maintenance of calcification.

ORAL DISEASES.

ter considering the normal, the abnormal systemic reactions ods now complicate the dental problem. The mouth is Nature's way to the nourishment of the body. It is also the index of ral health and systemic diseases. A physical examination would short in exactness without recording the oral conditions. Many e localized mouth problems are overshadowed by remote sys- c aggravation. No treatments or dietary procedures should prescribed without careful consideration of all the contributing ors. A diet with the essential requisites of overcoming acidosis n-diabetic ketosis) is always the aim in clearing the dental picture.

Stomatitis.

his is an acute or chronic superficial inflammation of the oral cosa, combined with redness, soreness, slight epithelial desqua- tion, dryness or most frequently serous exudate. Associated h the simple we must consider the acute ulcero-membranous givitis.

Ulcero-Membranous Gingivitis.

Synonyms.—Plaut-Vincent's infection, trench mouth, spirofusillary fusospirillary gingivitis, fusospirillosis, necrotic gingivitis, epi- nic ulcerous gingivitis, stomatocace, etc.

This disease results in destructive inflammation of the gingival rgin, including the papillæ and spreading over the adjacent tis- s as it progresses. It is characterized by a fetid odor, salivation, eration, severe pain and fever with enlarged lymph nodes. Re- nt clinical findings show a lessening of the period of treatment en the diet is supplemented with vitamins B_1 and B_2 in addition nicotinic acid therapy. Refer also to page 72.

Advise.—Three quarts of diluted citrus juices *per diem*, broth, t-boiled eggs, fish, steamed soft vegetables, boiled or pasteurized k, ice-cream, stewed fruits, cold drinks, milk toast with egg, tmeal, bananas, gelatin desserts, sponge cake.

Omit.—Tobacco, highly spiced and salted foods, pickles, alcohol, ndy, coarse foods and cereals requiring chewing, cake, pies, rches, carbonated water, etc., spinach, rhubarb, strawberries, pberries, currants, peas, beets, carrots, rye and white bread, ppy seed rolls, chocolate products and condiments, nuts, and ted butter.

Typical Menu.

eakfast:

Fruit juice (also use liberally between meals)
Strained cereal with cream and sugar
Milk *or* coffee with cream and sugar

Typical Menu.—(*Continued.*)

Luncheon:

Minced meat *or* soft-cooked eggs
Mashed potatoes
Finely chopped vegetables
Simple soft dessert, ripe banana *or* mashed stewed fruit
Milk

Dinner:

Cream *or* strained soup
Minced meat *or* fish
Mashed potatoes
Finely chopped vegetables
Mashed stewed fruit
Milk *or* cocoa

Periodontoclasia, "Pyorrhea Alveolaris."

This is a destructive inflammatory progressing necrosis of t gingival gum tissue, involving the alveolus and completely destro ing the attachment of the tooth in its socket, resulting in its loosen and falling out. Despite intense study and close investigati through many years, the etiology of this disease still remains o scure.

After the surgical procedure of removing the irritating calcareo deposits attached to the teeth and the necrotic gingival tissue, t dietary problem becomes important. It is, however, fairly co ceded that the disease is caused by both local and constitution factors. When the gums have healed sufficiently to withstan stimulation, foods requiring mastication to exercise gums and pr duce firm granulation tissue should be included in each meal. Foo with a high calcium content are necessary to keep a supply mineral matter in the blood stream to strengthen the alveolu Refer elsewhere for distribution of minerals.

Foods Which Exercise the Gums.—Meats; fruits—apples, pear oranges, peaches, melons; nuts; cereals; vegetables—corn, carro (raw); salad vegetables—lettuce, celery, cabbage, watercress, art chokes, avocados.

Acute and Chronic Inflammatory and Suppurative Conditions of the Dental Alveolus.

These conditions are always the sequelæ of the death of the pu of a tooth. Infection passes through the apico foramen, involvin the periapical tissues, bone and lymph stream.

After surgical intervention and thorough intestinal evacuatio the dietary problem becomes important. Fluids are taken in lar amounts to combat the infection and to stimulate toxin eliminati through the kidneys. A high-protein diet is prescribed to rebui the injured tissue. A low-fat and high-carbohydrate diet is indicat to overcome acidosis (ketosis). Refer elsewhere for Tabulation Food Factors.

Osteomyelitis.

ımmation of the jaw bones may either be the result of infec-ıvolving the periosteum (periostitis), or the marrow (osteo-tis), following alveolar abscess, stomatitis, or severe injury. titis or osteomyelitis may end in caries or molecular destruc-f the bone, or necrosis or death of a portion of the bone *en* . When this infection occurs in the lower jaw, not so fre-ly in the upper, the process is nearly always accompanied formation of a shell of new bone surrounding the inflammatory . The diet should consist of high calcium-containing foods to y the need for new bone. Foods requiring hard mastication l be avoided to prevent possible fracture. Refer elsewhere for s Highest in Calcium.

Jaw Fracture.

ter the jaw fragments have been approximated, their union from six to eight weeks. During the period of immobilization, patient must subsist on liquid and semi-solid food. This can ken through a tube or sipped through the interdental spaces e a tooth or teeth have been extracted. Teeth are never ved for this purpose, with the exception of the third molars. ıost fracture cases there is usually enough space between the ı to admit semi-solid foods. If such a case presents itself with dental arches completed and with the full component number eeth, fluids only will have to be resorted to. Temperatures of eme heat and cold such as hot soups and ice-cream, should be ided to prevent burns and sensitive teeth. Most of the mas-tory motion takes place with the lips and cheeks forcing the l through the interdental spaces, after which the tongue and e of the hard palate complete the act. The mouth should be oughly rinsed after each meal.

igh-Calcium, Liquid and Semi-solid Diets are suitable for jaw ture cases. Refer elsewhere for Foods Highest in Calcium, Fluid ds and Soft Foods.

Summary.

ı conclusion, the nutrition of the tooth is dependent upon five ods in the growth of dental structure. The diet of a woman re conception determines health and prepares her phys-y for the demands to be made upon her mineral salt reserve. ing pregnancy a high mineral diet must be continued. The od of infancy is directly dependent for the calcification of the h upon the mother's mineral balance. The proper composition rtificial formulæ is necessary when breast feeding is not resorted The mineral foundation of the teeth can be lost in early child-d and destroyed for youth by a restricted and unbalanced diet. the chain of mineral and vitamin diet is maintained with a thy body, through five foundation periods, the ideal dental cture can be obtained. Other influences that cannot be ignored proper amounts of sunshine, exercise, rest, periodic physical and

dental examinations. When the dental structure is disea[...] injured, the proper diet is important to alleviate the painful [...] toms and to assist in restoring dental health.

REFERENCES

DRAGSTEDT, L. R., HAMMOND, H. E. and ELLIS, S. C.: Pathogenesis of A[...] Pancreatitis. Arch. Surg. **28**:232, 1934.
OPIE, E. L.: The Etiology of Acute Hemorrhagic Pancreatitis. Bull. J[...] Hopkins Hospital **12**:121, 1901.
PRIESTLEY, J. T., COMFORT, M. W. and RADCLIFF, J.: Total Pancreat[...] for hyperinsulinism due to an islet cell adenoma. Ann. Surg. **119**:211, 1[...]
RICH, A. R. and DUFF, G. L.: Experimental and Pathological Studies on [...] Pathogenesis of Acute Hemorrhagic Pancreatitis. Bull. Johns Hop[...] Hosp. **52**:212, 1936.
WHIPPLE, A. O.: In CECIL, R. L., Textbook of Medicine, 7th ed., Philadelp[...] p. 891, W. B. Saunders Co.
WHIPPLE, A. O.: Observations on Radical Surgery for Lesions of the Panc[...] Surg. Gyn. and Obstet. **82**:623, 1946.
FOSDICK, L. S.: A Correlation of Recent Research in Dental Caries, New Y[...] Journal of Dentistry, Vol. XVII, No. 2, 1947 (55).
HUNTER, A. G.: Dental Journal, Australia, **17**:293-304, August, 1945.
MCKAY, F. S.: Iowa Dental Bul., **31**:117-118, Dec. 1945.
WILSON, G. W.: Year Book of Dentistry, 1946, 188-189.

PANCREATIC DISEASES

J. RUSSELL TWISS, M.D.

Discussion.—The function of the pancreas in regulating carb[...] hydrate metabolism by means of the internal secretion of insulin [...] well known. The external secretion of pancreatic juice is tra[...] mitted to the intestinal tract by means of the pancreatic du[...] Its digestive enzymes, trypsin, amylase and lipase are essential [...] the proper digestion of food. The flow of pancreatic juice is stim[...] lated by the secretion formed in the mucosa of the duodenum [...] response to the stimulation of food. Various types of inflamm[...] tory disturbances occur in the pancreas as a result of irritation [...] inflammation of the pancreatic tissue, usually secondary to t[...] obstruction of the flow of pancreatic secretion. Involvement of t[...] Islands of Langerhans by tumors or other lesions results in metabo[...] disturbances primarily concerned with carbohydrate metabolism.

Pancreatitis, Acute.—Acute pancreatitis may vary in severi[...] from a relatively mild interstitial form characterized primari[...] by edema to an acute hemorrhagic form which may be rapid[...] fatal. The acute symptoms may be preceded by those of a chron[...] cholecystitis or cholelithiasis, with which the acute pancreati[...] is frequently associated. The initial acute epigastric or umbilic[...] pain from which these patients suffer is apt to occur after alcoho[...] excesses, or a heavy meal. The pain may be in the left upp[...] quadrant and radiate to the back. Nausea and vomiting, chills a[...] fever are common. In the acute hemorrhagic form there is cyanos[...] shock, collapse, coma and frequently sudden death. On physic[...] examination the typical findings are those of an extremely to[...] and cyanotic patient in shock; the milder forms are less acute [...]

. There is tenderness without rigidity in the epigastrium and t upper quadrant, the pulse is rapid and weak. The diagnosis firmed by the presence of an elevation in the blood serum amyl- nd lipase, which however may be transient.

initial treatment is supportive and consists in the liberal intravenous fluids such as 5 per cent glucose and 5 per cent in hydrolysate. Plasma is sometimes necessary for the control ock. Penicillin in large doses seems to have been beneficial ute febrile conditions, probably those associated with infec- If, following the acute initial symptoms, the patient shows nprovement on medical and supportive therapy, the medical nen of supportive treatment supplanted later by pancreatic acts and vitamins may suffice. If, however, prompt improve- t does not occur, Whipple advises laparotomy, the operation of ce being a cholecystectomy to drain the bile and relieve the ion on the pancreas, with peritoneal drainage as well.

ancreatitis, Chronic.—A chronic fibrosis of the pancreas may ir, either of an intralobular or interacinar type. The underlying iological process is considered degenerative or inflammatory, n in some cases a resulting calcification of the pancreas which be identified by lateral films of the abdomen. The history of se patients is that of chronic indigestion, usually over a period many years, commonly associated with alcoholism. Pain is the st common symptom; it is epigastric in location, tends to radiate the back and is recurrent in character. Diarrhea is also common, multiple stools are large, frothy and fatty in appearance as well foul in odor. With this condition there may or may not be an vation in the blood serum amylase and lipase.

The treatment of chronic pancreatitis consists of the use of pan- atic extracts, 5 to 10 grains or more of the triple strength prepara- n being given after meals. If there is an associated diabetes llitus, this condition should receive appropriate treatment. e diet recommended is the high protein diet, No. 6, with vitamin oplements. The carbohydrate and fat content of this diet should reduced to a minimum.

Tumors of the Pancreas.—The most common tumor of the ncreas is carcinoma, which may involve the head or the body of gland. It is difficult to differentiate from carcinoma of the nmon bile duct. The onset may be a painless jaundice or there y be considerable epigastric pain which tends to radiate to the k. Loss of weight and strength occurs with anemia. An en- ged palpable gall-bladder is usually found with carcinoma of the d of the pancreas. The diagnosis is confirmed by the findings of odenal drainage, in which there is frequently an absence of duo- al bile and pancreatic ferments. There may be blood in the duo- al contents. The *x*-ray examination reveals at times a deformity he duodenum, a widening or actual filling defect.

The treatment of carcinoma of the pancreas is surgical, the ration of pancreatectomy and duodenectomy of Whipple is in- ated. Pre-operatively the high protein, high vitamin diet is icated (No. 6), with the necessary supportive intravenous fluids.

Adenomata of the pancreas form another group of pa tumors which are of interest from the viewpoint of their ass metabolic disturbances. These tumors commonly involve Islands of Langerhans, with a resulting hyperinsulinism and hy glycemia which gives characteristically periods of extreme weak and asthenia. During these spells the blood sugar is greatly duced; the diagnosis is confirmed by a glucose tolerance test, car out over a period of five hours. Similar findings may occur wi functional hypoglycemia.

The treatment of tumors is the surgical removal of the tu The preceding dietary treatment is preferably a high protein, carbohydrate diet. Diet No. 6 (p. 399) may be used, with sm meals and intermediate feedings.

REFERENCES

DRAGSTEDT, L.R., HAMMOND, H. E. and ELLIS, S. C.: Pathogenesis of Ac Pancreatitis. Arch. Surg. **28**:232, 1934.

OPIE, E. L.: The Etiology of Acute Hemorrhagic Pancreatitis. Bull. Jo Hopkins Hospital, **12**:121, 1901.

PRIESTLEY, J. T., COMFORT, M. W. and RADCLIFF, J.: Total Pancreatecto for hyperinsulinism due to an islet cell adenoma. Ann. Surg. **119**:211, 19

RICH, A. R. and DUFF, G. L.: Experimental and Pathological Studies on t Pathogenesis of Acute Hemorrhagic Pancreatitis. Bull. Johns Hopk Hosp. **52**:212, 1936.

WHIPPLE, A. O., in CECIL, R. L., Textbook of Medicine, 7th ed., Phila., p. 8 W. B. Saunders Co.

WHIPPLE, A. O.: Observations on Radical Surgery for Lesions of the Pancre Surg. Gyn. and Obstet. **82**:623, 1946.

PELLAGRA.

Discussion.—Pellagra presents a wide variety of symptoms refe able to the skin, gastro-intestinal tract, and nervous system. I etiology appears at last to have been found in nicotinic acid def ciency, due cognizance being taken of the fact that riboflavin an thiamin deficiencies are usually concomitant. The outstandin recent contributions (1935–1939) to the treatment of pellagra a those of Spies. Adequate doses (page 73) of nicotinic acid related compounds will heal the pellagrous glossitis, stomatiti vaginitis, urethritis, and proctitis; will blanch early erythemato lesions; will restore at least some measure of gastro-intestinal fun tion; and will lead to a prompt remission of mental abnormalitie

To quote from Spies and his co-workers (*Annals of Intern Medicine*, **12**, 1830, 1939): "The development of severe pellag can, in most instances, be avoided if the disease is recognized in i early forms and treated appropriately. It is apparent, from a stud of many pellagrins, that there is a long prodromal period of i health. This period has insidiously advancing symptoms, all trivi in nature, but gaining in importance by their persistence. Loss weight, strength, and appetite precede the appearance of any dia nostic oral or dermal lesions. During this early stage, ill-define disturbances of the alimentary tract, including indigestion, 'dy

.' diarrhea or constipation, as well as weakness and lassitude p without obvious reason. Irritability, depression, loss of ry, headache and insomnia are noted. Other early symptoms teristic of a deficiency of the anti-pellagric factors include ninal pain, burning sensations in various parts of the body, o numbness, nervousness, palpitation, distractibility, flight as, apprehension, and mental confusion. There is obviously that is abnormal but nothing which is pathognomonic. The syndrome of vague, grumbling complaints appears to be with- bjective cause and if a patient is seen at this stage of the disease pellagra is not suspected or suggested, a diagnosis of neuras- a may be entertained by the physician.

n early diagnosis of pellagra is made possible by the recognition ese prodromal symptoms if they are associated with prolonged stence on an inadequate diet; if they occur in persons who have ulty in ingesting, assimilating, or utilizing food because of nic disease; or if they appear in persons whose requirement for pellagric substances is increased by pregnancy, lactation, hyper- oidism, infection, or increased physical exercise. The develop- t of clinical pellagra can be prevented in these subclinical cases he administration of adequate amounts of nicotinic acid. Fol- ng its administration these persons experience an increase in e of well-being and vigor almost immediately. Indigestion is ved, nausea ceases, and bowel function is restored to normal. vousness, irritability, and mental confusion disappear rapidly owing adequate dosage, and the vague burning sensations in ious parts of the body disappear soon after treatment is initiated. hough improvement in symptoms arising from the alimentary t and cerebral cortex is striking, many of the pellagrins develop neuritis which becomes worse in spite of continued therapy h nicotinic acid or related compounds. (The administration of ssive doses of nicotinic acid does not relieve either the painful nptoms of beriberi, arising from involvement of the peripheral ves, or the symptoms of riboflavin deficiency which arise from lesions around the mouth, nose, eyes, and ears, whereas the ninistration of synthetic thiamin hydrochloride and synthetic oflavin, respectively, is followed by prompt disappearance of these nptoms.)

The amount of nicotinic acid needed to relieve these early symp- s and to prevent the development of clinical pellagra cannot be dicted, nor can it be determined other than by frequent examina- of the patient. The amount needed by an individual may vary n time to time and often it is necessary to adjust the dosage to t this changing need. There is also considerable variation in amount needed by different patients. As little as 50 milligrams y may be effective in some cases, while 500 to 1000 milligrams is netimes required in others, although this is seldom necessary. therapeutic effect of these substances is proportional not only he total dosage, but also to the size and frequency of the indi- ual dose. That is to say, the oral administration of ten doses of

50 milligrams each at hourly intervals is more effective than a sing dose of 500 milligrams. This suggests that the controlling factor the concentration of compounds of nicotinic acid in the blood a tissues.

"Observations on the children in several hundred 'pellagra fam lies' have shown that many of these children have early clini signs of pellagra. Such children often have a history as follo For years they have been somewhat below normal in weight a height; their progress in school has been slow; their inability concentrate is apparent; and they have few interests. Frequen they complain of poor appetite, indigestion, vomiting, soreness the tongue and lips, and constipation. Their parents report th they are cross, 'fretful,' and cry easily. A careful check on the dieta history of the family often shows that the diet of the mother duri pregnancy was inadequate and that shortly after birth the child ha to be given food of some sort as the mother gave insufficient mil hence, from a short time after birth, such children have frequent been a 'feeding problem.' In addition, many of these childre show a preference for only one or two foods and refuse all other The diet is usually rich in carbohydrates, and when milk, eggs an meat are included, they rarely are given in sufficient amount When the children have clinical evidence of the disease as shown b characteristic glossitis or dermatitis, there can be no question of th diagnosis, and nicotinic acid therapy is as effective as it is in adu pellagrins. However, spectacular improvement following therap with nicotinic acid or some closely related anti-pellagric compound ha been noted in many children who have subsisted over long periods o time on an inadequate diet but who show none of the diagnosti symptoms of pellagra. In general, the complaints of these childre have been similar to those of adults. Likewise, the method of stud was similar but the amount of nicotinic acid given was less. Withi twenty-four to thirty-six hours after the administration of nicotini acid there was prompt improvement in general health and disap pearance of the various complaints. Usually, these children wer given a total daily dose, varying from 50 to 300 milligrams. W recommend that this total dose be given in from 5 to 10 tablet at least one hour apart. Children from two to six years of age ar usually given tablets of the 10 milligram size, and those up t puberty are given tablets of the 25 milligram size. In treating clini cal beriberi and clinical riboflavin deficiency occurring in thes children, we gave one-half the amount of synthetic thiamin hydro chloride and synthetic riboflavin recommended below* for an adult."

The diet of the pellagrin is inadequate in calories, protein, calcium iron, and vitamins. Lean meat, milk, eggs, fresh fruit and vege tables will meet this need but often are not economically possibl since the disease is most common among poverty-stricken people Similar deficiency, however, may result from illness, chronic alcohol ism or addiction to diet fads.

The dietary management of pellagra as outlined by Sebrell (1938 involves:

1. Inclusion in the diet of at least 1 quart of milk daily.
2. A diet of 3000 to 4000 Cal. or more, utilizing those foods rich in the P-P factor, especially liver and lean meats.
3. Not less than 30 grams and up to 200 grams (or more) daily of pure, dried powdered yeast, depending on the severity of the attack.
4. Liver extracts, either orally or parenterally, in very large doses in severe cases.
5. Feedings at frequent intervals and careful, individual nursing to see that the patient eats and retains the large amount of food necessary.
6. Symptomatic treatment as indicated.
7. Nicotinic acid orally or parenterally as indicated, in sufficient dosage to relieve acute symptoms rapidly.

s stressed by Sebrell, liver extracts are of value as an adjunct nicotinic acid, yeast, and dietary treatment, and as a means of enteral administration of the P–P factor when severe vomiting diarrhea render oral administration impractical. Since these racts are prepared and standardized for their effect in pernicious mia, they may prove to be relatively worthless in pellagra unless ployed in apparently excessive amounts. For hte oral route, es recommends 75 to 100 grams of liver extract daily, for intranous therapy three to five doses of 20 cc. each.

To prevent recurrence of pellagra, a diet should be devised which reasonably practical for the patient. Where the patient cannot will not obtain suitable food, it may be necessary to prescribe nicoic acid. Such a practice must, at present, be heartily condemned.

PEMPHIGUS.

Refer to page 305.

PERIODIC DISTURBANCES.

Discussion.—A fund of information is gradually accumulating th regard to biochemical changes which occur periodically and anifest themselves by altered physiologic behavior. These cyclic anges are readily apparent in females but not entirely confined to em.

Prior to the onset of the menstrual flow, there is retention of dium and water sufficient to produce a feeling of fullness or even comfort in apparently normal individuals. Under more or less normal conditions, there is obvious evidence of edema. "Canker res" are not infrequent (refer to page 290) and more extensive eration is occasionally seen, leading to the diagnosis of Vincent's gina (refer to page 72). Localized edema may reach alarming oportions in the mouth and throat, even necessitating tracheotny in an effort to save life.

Thiamin, 10–20 mg. twice daily (oral administration), in mild to severe cases, mg. daily in physiological saline intravenously in very severe cases; riboflavin o 15 mg. daily (oral administration).

According to Cameron (1939) lack of vitamin A is associated w storage of water in various tissues of the body, notably in the le region in the early stages of deficiency. It has been suggested t vitamin A may be of value in treating patients with water retent of obscure origin.

An extreme drop in the polymorphonuclear neutrophils is as ciated with ulcerations of the mucous membranes throughout t body. Although most frequent in women, periodic agranulocyt angina has also been reported in men.

With many individuals there is a definite decrease in the leucocy count twenty-four to seventy-two hours before the menstrual peri or during the first two days. Caution, therefore, should be exercis at this time in administering any drug known to have a depressi effect upon the blood leucocytes. Arsenic, aminopyrine, and di trophenol have been conspicuous offenders in this regard. Althoug spectacular recovery from the angina may be observed on the fourt or fifth day of the menstrual period, some cases persist for two week or somewhat longer with only a short interval of freedom from symp toms before the sudden onset of the succeeding attack.

The etiology of periodic neutropenia undoubtedly will be solve in the future through more extensive investigations into the bio chemical behavior of the endocrines. With the present state o knowledge, there is one possibility which should not be ignored an that is the effect of emotional upheaval. Particular warning i raised against the strain of adolescent school life when complicate with many social activities since too great a burden may be impose upon the thyroid and other glands.

Although only a small group of women suffer alarming symptom periodically, a large percentage are affected by lack of resistance t pustular and other infections. Concurrently, there is diminishe tolerance for carbohydrates and increased susceptibility of ketosis The tendency to water retention with consequent increase in weigh (usually 2 to 3 pounds) should be recognized especially whenever a weight reduction schedule is under way.

These observations suggest the advisability of undertaking certai dietary restrictions during the premenstrual period (two to thre days usually, although changes may be noted as far as ten day ahead). A high-vitamin, relatively high-protein, moderate-carbo hydrate, low-fat, low-salt diet with limited water intake is suggested Theoretically, vitamin A is particularly indicated because of it possible relation to water retention, to the thyroid gland, and to th mucous membranes of the body. The prescribed diet, however restricts several items which are excellent sources of this vitamin The deficit should be made good by deliberate selection of thos vegetables and fruits rich in vitamin A (refer to page 59). Possibly the administration of 5000 to 10,000 units daily in concentrate form, such as shark-liver oil, should be begun ten days before th onset of the period. Since the blood cholesterol tends to fall prio to catamenia, an egg a day is recommended. Sodium bicarbonat and all alkaline mineral waters should be avoided because of th enhanced effect on water retention. Generous use should be mad

acidifying fruits and their juices (cranberry, plum and prune) acids are dehydrating.

e specification of low-salt intake is to be interpreted liberally s conditions warrant further restriction. Many items forbidden e salt-poor diet (page 257) are introduced because they are wise desirable. The subject should acquire sufficient knowl- regarding the salt content of common foods to make an intelli- selection from those presented. Pot cheese is apt to be the cheese which does not contain an appreciable amount of sodium ride. Canned foods in general are preserved with generous tities of salt. Cereals, whether prepared at home or purchased y-to-eat, reach the table with added salt; from the data pre- ed in Table 71 (page 788) it is apparent that *Shredded Wheat* omparatively low in sodium chloride. Bakery products rate erately high for foods which do not taste salty. Tomato juice be purchased with relatively little or much salt.

ised.	*Limit.*
ggs	Bread and crackers
Iilk	Butter, preferably unsalted
Ieat and fish	Chocolate and cocoa
ruits, raw and cooked	Cream
egetables, raw and cooked	Highly sweetened foods
it.	
lcohol	Meat sauces, com.
lkaline mineral waters	Meat soups
and medication	Prepared bouillon
andy	Pickles
obacco	Potato chips
	Rich pastries
anned meats or fish	Sausage
heese, except pot	Shellfish

All foods which taste salty (those brined, corned, pickled, smoked.)

Typical Menu.

arising:
1 T. brewer's yeast in ½ glass of water.

eakfast:
ruit (not juice, except where no other beverage is taken)
Egg (minimum salt) *or* cereal
Toast *or* roll with ½ pat of butter
Coffee-flavored milk

ncheon:
Pot cheese, eggs, cold chicken or fresh meat
Fruit or vegetable salad with lemon or vinegar
Or
Hot vegetable plate
Whole grain bread with ½ pat of butter
Prune whip or other simple dessert
Glass of water *or* tea with lemon

Typical Menu.—(*Continued.*)

Midafternoon:
6 oz. water, fruit juice, tea, or carbonated beverage

Dinner:
Meat *or* fish
Potato and other cooked vegetable
Raw vegetable salad with Melba toast or unsalted cracker
Gelatin dessert *or* simple pudding
Fruit juice, coffee, *or* tea

Evening:
Fresh fruit, if desired

Suggestions.—During the time when hormonal activity is rapid approaching the peak which culminates in the menstrual flow women should obtain additional rest either during the day or a night. They should seek some not-too-strenuous exercise out-o doors; walking is ideal. The days should be planned so as to avoi rush, worry or exhausting mental effort. Restriction of the diet t simple, vitamin-rich foods is an approach to the ideal which ma well become habitual. Many of the minor afflictions of women ca be warded off by such a regimen.

PNEUMONIA

Since the treatment of pneumonia with penicillin and the sul phonamides has so shortened the course of the disease, there is no longer any reason for special dietary considerations. Following the acute phase, however, there is usually some debility. During thi phase it is wise to increase the protein in the diet to at least 12 grams. This can best be accomplished by supplementary feedings o eggnog or plain milk three times daily in addition to extra meat fish and cheese at meal times. It is well to keep in mind that th between meal feedings should be had within an hour and a half o the preceeding meal. If the supplementary feedings are had withi three hours of the next succeeding meal the appetite for this meal i likely to be poor. It is also well to supplement the diet with one o the general vitamin preparations.

POISONING FROM SPRAY RESIDUES.

Discussion.—For the control of insect pests, vegetables and fruit are subjected to sprays the toxic agent of which is usually arseni in combination with lead, copper, or calcium. When improperl applied and imperfectly removed, these spray residues constitut a definite health hazard. The tolerances for apples and pear shipped within the jurisdiction of the Federal Food, Drug, an Cosmetic Act (1940) have been set at 0.05 grain of lead and 0.0 grain of arsenic (as arsenic trioxide) per pound. The tolerance fo fluorine sprays will remain at the level set in 1938, viz., 0.02 grai per pound. The physiologic effect of repeated ingestion of suc amounts of arsenic and lead is unknown.

soning from arsenic spray residue is not uncommon. In acute , gastro-intestinal symptoms predominate. The symptoms iated with chronic poisoning include recurrent, generalized atitis with or without brownish pigmentation, pruritis, hyper-tosis of the palms and soles, alopecia, burning and tingling sensa- in the extremities, general weakness, vertigo, disturbances of notion, neuritis, and dyspepsia. Although there is little or no f that thiosulfate injections aid in the urinary excretion of nic, they are usually employed in cases of suspected poisoning. re is increasing conviction, however, that such procedures are ess.

oods commonly sprayed are apples, blueberries, broccoli, cab-, cauliflower, celery, cherries, grapefruit, grapes, oranges, hes, pears, and plums. Yeast exhibits preferential absorption rsenic from hops during the manufacture of beer. Wines, cider, other fruit juices may contain appreciable amounts of arsenic lead. Canned and foil-wrapped foods are also frequently taminated with these elements. In a limited series of biologic eriments Mattice (unpublished observations, 1936) found fresh nge juice to yield twice as much arsenic as tap water; canned nato juice rated slightly higher, whereas canned pineapple juice o ver three times and canned grapefruit juice over four times as h in arsenic. It occurs regularly as an impurity in commercial cose, in the shellac coating employed on confectionery, and occa-nally in the colored paper used for wrapping candy (Cannon, 6) although efforts to correct this situation are being made.

It is practically impossible to predict the arsenic content of an lividual food. Even products such as meat, milk, eggs, cane-gar, etc., which might reasonably be expected to be free from senic may contain small amounts (Boos and Werby, 1935). In neral, liver contains more arsenic than other forms of meat. ne arsenic content of cod-liver oil should not be ignored (Holmes d Remington, 1934, report 1.4 to 3.3 p.p.m. As in this oil). In rtain localities the soil is rich in arsenical minerals or may acquire e element through continuous spraying of gardens and orchards; ot vegetables and drinking water may thus be subjected to con-mination. Routine tests are not made by health authorities for ssible arsenic in drinking water even when the collecting reservoirs aw upon water-sheds which are heavily sprayed (Ayres and Ander-, 1934). Aluminum sulphate used for purification of water may ntain arsenic (Cannon, 1936).

Naturally-occurring arsenic reaches its greatest concentration in -foods, particularly mollusks and crustaceans. Shrimp heads e list, over 40 mg. of arsenic trioxide per kg. of fresh material ving been reported. Physiologically, such arsenic is treated differ-tly from spray residues both as to storage and elimination (Coul-n, 1935) and appears to be much less toxic.

Iron preparations used for medication are never free from arsenic. som salts usually and baking powder frequently contain traces arsenic and lead. Most salves and ointments are contaminated th arsenic.

Where restriction of arsenic and lead ingestion is indica diets are identical except that crustaceans and mollusks a included on a low lead menu. Since blueberries are spraye calcium arsenate, they are not likely to be a source of lead poi Foil-wrapped and canned foods, however, are more apt to p lead than arsenic poisoning. From dietary sources the lead averages 0.25 mg. per day. Lead water-pipes may pro additional 0.1 mg. per diem. Ingestion of such water over a of several months is frequently attended by symptoms.

Spray Residue Removal.—Surface lead and arsenic com may be removed from fruits and vegetables by adequate w although this does not necessarily reduce the metallic conte safe level especially for those who are sensitive to these toxic a Spray residues collect on cauliflower principally at the junc the leaves with the main stalk; since adequate removal is a plished only by cutting and scrubbing these parts with a the prevailing custom of cooking this vegetable with the head is to be discouraged. If the outer three or four layers of cabbag tightly-headed lettuce are discarded, little residue should b countered. Lettuce is permissible at all times in an arseni lead-low diet provided the individual leaves are scrubbed.

Due to increase in coddling moth infestation, heavier spray those applied heretofore are being used on apples and pears. arsenate applied in combination with soap, fish or petroleum difficult to remove. As a result of spraying, apple wax may co lead ursolate. The two major solvents, hydrochloric acid and so silicate, are not effective if the spray becomes imbedded i natural wax of the fruit or in petroleum oil deposits. If the fr picked early and cleaned before storing for more than two to days and if no oil has been employed except very early in the se 1 per cent hydrochloric acid provides a satisfactory washing me (Robinson, 1933). The only practical degumming agent for sumer use is kerosene.

Foods may be treated at home in large earthenware c (metal containers are attacked by the acid) with 1 to 2 gallon per cent HCl after being carefully washed in running water drained. Three minutes' submersion is usually ample exp to the acid. Under average conditions the acid should be ren twice a week, the container being washed well after discardin poison-laden acid. Thorough washing (five minutes) in ru water is required to remove the acid from the food before it gested or prepared for cooking.

Where the foregoing procedure is not practical, certain fruit vegetables can be scrubbed with a brush using borax and ru water. Where neither process is feasible, as with berries, ru water should be employed with as forcible a stream as pos Before washing, fruit stems and adherent leaves should be rem It should not be forgotten that the spray residue collects at the and stem ends of fruits in concentrations which are highly toxi

Diets.—It has been observed by Von Glahn and Flinn

ncidence of hepatic cirrhosis in rabbits, produced by the of lead arsenate, is reduced when powdered brewer's yeast to the diet. From this experimental work it may be in- at the increasingly popular habit of taking a teaspoonful 's yeast suspended in water on arising in the morning is to raged, not only from the benefit to be derived from the vitamin intake, but also for the possibility of securing asure of protection against spray residue poisoning. It remembered, however, that the yeast itself is not arsenic- should be withheld from patients who are being studied rence to arsenic excretion.

ger and Hawkins (1940) found that a high-protein and ohydrate diet was protective against liver damage in the of administered arsphenamine. Fat, on the other hand, onstrably injurious.

h-calcium diet is believed to act as a preventive of lead g by diminishing absorption from the intestinal tract. Such ads to a decrease in the blood lead content while a low- diet with or without ammonium chloride results in increased ues. More of this element is stored in the body when the ow in calcium than otherwise (Calvery, 1938). It has been out by Manville (1940) that bone meal is used in some baby pparently without toxic effects. The richness of bone meal m may account for this behavior although it is possible that sence of lead is generally not recognized. On diets low in and phosphorus Manville in animal experiments was able onstrate a definite protective action of apple against lead g. The active constituent is unknown but it is presumably ium; possibly it is an uronic acid.

e various observations should be respected in attempting to e a diet to off-set possible exposure to arsenic or lead. ed intake of ascorbic acid is desirable in lead poisoning.

nas and milk (New York City) provide a practically arsenic- t (Mattice and Harrison, unpublished observation, 1936). eral years, Weisman and Mattice (1936) have employed a ich has been found experimentally to be arsenic-low.

fresh	Meats
	Ice-cream, home-made
vegetables (potatoes,	Dairy products (milk, cream,
rots, onions, beets)	eggs, unwrapped cheese)
sh and pumpkin	Bananas
lant	Melons
d fresh tomatoes	Rhubarb (cooked with brown
s, navy and lima	or maple sugar*)
washed leaf lettuce	Lemon juice
mber, fresh	Tea and coffee

e sugar may contain appreciable amounts of lead unless specially processed

Liberalization of this diet is possible in certain instances by the use of adequately washed foods otherwise forbidden.

Omit.

- Apples
- Apricots
- Asparagus
- Breadstuffs
- Broccoli
- Brussels sprouts
- Cabbage
- Candy
- Canned foods
- Cauliflower
- Celery
- Cherries
- Chili powder
- Chocolate
- Cod-liver oil
- Collards
- Cranberries
- Currants
- Foil-wrapped foods
- Fruit juices
- Gooseberries
- Beer
- Blackberries
- Blueberries
- Grapes
- Ice-cream, commercial
- Kale
- Liver
- Orange or lemon rind or gratin
- Peaches
- Pears
- Peppers
- Plums
- Sea-foods, except whitefish
- Soft drinks
- Spinach
- Strawberries
- Syrups, except pure maple
- Vinegar
- Watercress
- Wine
- Yeast

Limit.

- Cane sugar
- Fresh orange juice
- Gelatin
- Tomato juice

Sample Menu.

Breakfast:

- Sliced banana or melon
- Farina with cream
- Eggs (2), poached
- Bacon
- Coffee with cream

Luncheon:

- Broiled lamb chops
- Creamed potato
- Squash with butter
- Banana mousse
- Tea

Dinner:

- Cream of fresh pea soup
- Chicken fricassee
- Mashed potato
- Lima beans with butter
- Custard
- Coffee with cream

estions.—The preceding diet has been experimentally ascer- to contain a mimimal amount of arsenic. Probably other getables may be employed. Where deprivation of bread is a ip, two slices daily may be permitted. A high-carbohydrate desirable for replenishing the glycogen stores of the liver and rotecting this organ against possible arsenic damage. Experi- lly, liberal amounts of sugars and syrups in the diet are d by greater excretion of arsenic than is seen on the nended diet.

PREGNANCY.

Refer to page 410.

PROCTITIS.

Refer to page 504.

PRURITUS ANI.

Refer to page 505.

PSORIASIS.

Refer to page 307.

PYELITIS.

Refer to page 568.

PYLORIC STENOSIS AND PYLORIC SPASM

VINCENT LARKIN, M.D.

loric stenosis and *pyloric spasm* only will be discussed in detail use they occur with considerable frequency in young infants. onset of symptoms generally occurs after the second week of ut may be present at birth or may not begin until the infant is a h old. The condition occurs most frequently in first born in- . It occurs about three times as frequently in boys as in girls. obstruction at the pylorus is due to hypertrophy or spasm, or , of the circular muscle of the pylorus. The classic symptoms projectile vomiting that is not bile stained, loss of weight, in- ing constipation, visible peristalsis, and a palpable pyloric r. The pyloric tumor is not present in pyloric spasm, but all ther symptoms can be found. Pyloric stenosis generally occurs younger age than pyloric spasm, but both conditions occur in rst six weeks of life and they cannot always be differentiated on asis of history, physical examination and stomach *x*-rays. A peutic trial with anti-spasmodics and changes in formula are necessary to establish the differential between stenosis and n. In a patient with severe symptoms, in whom a pyloric

tumor is palpable, a therapeutic trial is not indicated, and surgery is performed as soon as the condition of the infant warrants it.

Since an occasional infant develops the symptoms of pyloric spasm on a whole milk or evaporated milk formula, the first step is to determine whether the construction of the formula is correct. If the formula construction is satisfactory the milk should be changed, *e. g.* from evaporated to whole milk, or vice versa, from homogenized to non-homogenized varieties of milk. If the type of milk is at fault the change to another milk will halt the vomiting immediately. Should the vomiting continue for twenty-four hours after the change in formula, therapeutic tests of antispasmodics should be tried. It must be emphasized, however, that the therapeutic trial of drugs and formula change should not be continued unless the vomiting ceases and the child begins to improve immediately.

Atropine and phenobarbital are the drugs of choice in the diagnosis and treatment of pyloric spasm; of these atropine is the more valuable. Because the solutions of atropine are not of constant strength it is advisable to prepare the individual dose each time from the 1/1000 grain tablet. The initial dose is 1/1000 grain (1 tablet) of atropine sulfate, dissolved in a teaspoonful of water, given fifteen minutes before each feeding. The dose is increased by $\frac{1}{2}$ tablet before each feeding every twenty-four hours until vomiting ceases or signs of atropine toxicity appear, *i. e.* fever and flushing of the skin. Elixir of phenobarbital ($\frac{1}{4}$ grain to the teaspoonful) may be given if atropine fails to relieve the vomiting but less success is obtained with this drug. The dose of phenobarbital is $\frac{1}{8}$ grain ($\frac{1}{2}$ teaspoonful of the elixir) ten minutes before each feeding, increased by $\frac{1}{8}$ grain before each feeding every twenty-four hours until vomiting ceases or the infant becomes drowsy.

Formulas thickened with cereal should be fed to the infant when antispasmodics fail to stop the vomiting. The thickened formula is taken well by the hungry baby and it is difficult to vomit. Infants with pyloric spasm usually stop vomiting as soon as feeding of the thickened formula is begun. Failure of the cereal formula mixture to stop the vomiting within two to three days is suggestive of a diagnosis of pyloric stenosis. The formula is made by adding 6 to 8 tablespoonfuls of a starch cereal, like farina, to the regular formula of the infant. The mixture is brought to a boil over the open flame and then transferred to a double boiler, where it is allowed to cook until the mixture is so thick that it will not fall off an inverted spoon. Then it is divided into 6 equal portions, put into bottles and refrigerated. The feeding may be given by spoon or by cutting the top off the nipple and allowing the infant to suck the thick feeding. It is a common misconception that extra fluids must be given either orally or parenterally to the infant between feedings of the thick cereal formula. In office experience, the hydration of the infant remains satisfactory provided the formula has been prepared with an adequate amount of water. Frequently the mother attempts to speed the thickening process in preparing the formula by reducing drastically the amount of water with which she usually makes the

al formula. If the original formula is made as usual and the l is added thereafter, dehydration should not occur on this of feeding. If the thick cereal feeding makes the infant stop ting, it should be continued for one or more months. At vals, liquid feedings may be introduced and when these are ned the cereal may be removed gradually from the formula. e vomiting persists on the thick cereal formula, this method of ment should not be continued beyond seventy-two hours. ration of the stomach contents and gastric lavage with a solution carbonate of soda are generally recommended prior to feeding infants in an attempt to relieve gastric irritation. This type eatment appears to be unnecessary and has not produced any rnible reduction in the amount of vomiting of patients with re pyloric stenosis or pyloric spasm.

he pre-operative care of patients with pyloric stenosis involves oration of fluid balance by correction of dehydration and restion of mineral balance by overcoming alkalosis when present. simplest treatment involves the administration of an intraous solution of 5 per cent glucose in saline by continuous drip at te of about 8 to 10 drops per minute in twenty-four hours. If losis is severe, intravenous ammonium chloride may be given. nemia is present, as may be the case in untreated patients, whole od transfusion is indicated. The nursing procedures that are e recommended and which are routine on the Babies Ward of New York Post-Graduate Hospital are as follows:

. Maintain normal body temperature, using sunlamp if necessary.
. Restrain hands by wrapping in blanket if there is any tendency to suck fingers.
. Note the type, consistency and times of vomitus—keep an exact record of type and amount of vomiting.
. Feed infant slowly and carefully.
. Note stools of infant.
. Record weight daily.
. Note any symptom of toxicity of any antispasmodic given, as for atropine:
  - rash
  - temperature
  - flushed face
  - dilated pupils
. If infant is malnourished wrap with one inch cotton wadding and bandage. Then dress in shirt, diapers and flannel gown. If temperature is not well stabilized send to operating room with hot water bottle, temperature 100°.
. Aspirate infant's stomach one hour before going to operating room.

he post-operative care of these patients is primarily concerned h the feeding and there is considerable difference of opinion as to soon feeding should be begun. When formulas are started too

soon, post-operative vomiting and diarrhea are frequent comp tions. The routine we have followed for some years on the Bab Ward of the New York Post-Graduate Hospital has given a mi mum of vomiting or diarrhea. It begins approximately two ho after the baby has returned from the operating room, later if th baby has not reacted from the anesthetic. Sterile water is given slowly increasing quantities for the first twenty-four hours. Ther after a small amount of dilute formula is begun and this is gradual increased and strengthened according to the tolerance of the infan This routine is as follows:

1. Feed infant slowly with a small nipple having small holes.
2. To minimize the handling of the infant, feed him in bed f the first five post-operative days—but pick him up for eruct tion before and after feeding.
3. Measure amounts of formula and water accurately in steri medicine glass.
4. Pyloric feeding regimen feeding starts two hours followi operation, condition permitting.

FEEDING:

Hour	Water	Drams	Hours	Formula	Oz
1st	"	1	22nd	"	1
2nd	"	1	23rd	"	1
3rd	"	1	24th	"	1
4th	"	2	26th	"	1
5th	"	2	28th	"	1
6th	"	2	30th	"	1
7th	"	3	32nd	"	1
8th	"	3	34th	"	1
9th	"	3	36th	"	1
10th	"	4	39th	"	2
11th	"	4	42nd	"	2
12th	"	4	45th	"	2
13th	"	5	48th	"	2
14th	"	5	51st	"	2
15th	"	5	54th	"	2
16th	"	6	57th	"	2
17th	"	6	60th	"	2
18th	"	6	63rd	"	2
19th	"	7	66th	"	2
20th	"	7	69th	"	2
21st	"	7	72nd	"	2
			75th	"	2
			78th	"	2
			81st	"	2
			84th	"	2
			87th	"	2
			90th	"	3
			93rd	"	3

Remainder of formula will be ordered by doctor.
If infant vomits do not increase feeding but go back to previous feeding.
If infant vomits more than one feeding, keep vomiting chart.
Keep vomiting chart on patient until discontinued by doctor.
e post-operative nursing care is also important and our routine follows:
Restrain the infant's hands by wrapping in blanket.
Elevate head of bed very slightly.
Maintain normal body temperature by external heat if necessary.
Watch infant carefully for any aspiration of mucus.
hen the infant has been breast fed it is not always possible to tain the mother's supply of milk though an attempt should nade by pumping her breast regularly and using this breast instead of a formula for the infant.

RECTAL CONDITIONS

Harold Clark, M.D.

re-operative Diet.—The patient should not be subjected to stic catharsis nor placed on a starvation or restricted diet several s prior to operation. The day preceding the operation the ient may partake of the usual breakfast and lunch and the orary evening meal; increased intake of water and sugar is advised. s routine is followed when the patient's operation is scheduled the morning. Should the operation take place in the afternoon, patient may have a light breakfast consisting of orange juice h sugar, toast and a cup of coffee with milk. A cleansing enema aline or soapsuds two to three hours preoperatively is sufficient lear the lower rectum.

ost-operative Diet.—An attempt is made to establish routine its as soon as possible. A non-residue diet fluid is given the first toperative day; thereafter the patient is encouraged to partake regular diet, with the noted exceptions.

oods to be *omitted* post-operatively are as follows: All wellwn gas-producing foods, *i. e.*, cabbage, onions, turnips; sharp irritating foods, *i. e.*, peppers, mustard, chili-sauce, foods with egar dressings, pickles. Refer to Flatulence-Producing Foods.

orty-eight hours after operation the patient's bowels are moved means of 8 ounces of warm olive oil, as a retention oil enema. patient is instructed to chew all food thoroughly and is allowed same food as before operation provided the result is a semi-solid ol of soft consistency. Hard and scybalous stools irritate the er rectum and anus, and thus interfere with the rapid repair of wound. The generous use of bananas may be helpful in securing eta of the desired consistency. Avoid highly seasoned foods,

spices, ketchup, chili sauce, vinegar, pickles, mustard and salted herring.

For post-operative use the recommended foods are those which will give a well-formed stool.

Advised.

Bread	Green vegetables
Cereals, well cooked	Raw and cooked fruits
Cheese	Oatmeal
Creamed soups	Pastries
Eggs	Pies
Farina	Ripe bananas
Toast	Wheatena

Omit (immediately after operation).

Alcoholic beverages	Raw milk (especially in cases where it is apt to cause diarrhea)
Carbonated beverages	Spices
Pickled and smoked foods	Tomatoes
Peppers	Nuts

Limit.

Beans	Cauliflower	Onions
Brussels sprouts	Garlic	Peas
Cabbage	Lentils	Squash

Diet After Operation.

Typical Menu.

Breakfast:
- Cooked cereal with cream and sugar
- Eggs, except fried
- Toast or rolls with butter
- Coffee with cream and sugar

Luncheon:
- Cream of vegetable soup
- Choice: Potato, macaroni, noodles, rice, spaghetti *or* vermicelli
- Choice: Minced meat *or* fish, eggs *or* cottage cheese
- Bread with butter
- Puréed fruit
- Tea

Dinner:
- Strained soup
- Meat or fish
- Potato, baked or mashed
- Puréed vegetable
- Bread with butter
- Simple pudding
- Coffee *or* tea

Suggestions.—Spicy and highly seasoned foods, salted herring, pickles, chili sauce, ketchup, vinegar and mustard should be limited for the first two weeks after operation, as the patient may be

arrassed, especially when the sphincter is inadequate, raw and y irritated.

ssure-in-ano.—**Discussion.**—Many patients suffering from fis--in-ano complain of pain during and after defecation and become nically constipated through procrastination. The diet, there-, should be one that will secure a soft formed stool. Indigestible ls and careless chewing of the food should be avoided.

he foods permitted and limited are the same as suggested for ents with hemorrhoids with emphasis on the avoidance of all y or highly seasoned foods.

Iemorrhoids.—Discussion.—The patients complaining of hemor-ids are in most instances those who have been constipated for a g time. They also have a tendency to strain at stool. Continual ining during defecation will cause an engorgement of the hemor-idal veins with a resultant prolapse of the hemorrhoids. The , therefore, should be one that will produce a soft formed, non-tating stool. Forcing of fluids is indicated. Natural fruit laxa-e may prove helpful. A rich source of the vitamin-B complex, h as brewer's yeast taken each morning, is to be recommended.

vised.

Bananas	Salads with olive oil dressings
Bread	Soups, clear
Butter	Vegetables (all kinds, except potatoes)
Buttermilk	Zoolak and other fermented milks
Eggs	
Fruits, raw or cooked	

nit.

Alcoholic beverages	Cocoa	Milk
Alimentary pastes	Coffee	Spices
Beans	Highly seasoned foods	Thick or creamed soups
Cabbage		
Cheese		

After hemorrhoidal operations the diet should be one which will e the patient most comfort, as the perianal and perirectal tissues very sensitive. The routine post operative diet as outlined ove is adequate in most instances. Evacuation is aided in forty-ht hours with the oil rentention enema. These patients may have take 1 or 2 tablespoonfuls of mineral oil upon retiring. Daily rm sitz baths will aid greatly in healing the local parts.

rised.

Bread with butter	Green vegetables	Molasses
Fish	Honey	Prunes and apricots
Fruit, raw or cooked	Jam	Salads and olive oil dressings
Fruit juices	Marmalade	
Gelatin preparations		

Omit.

Alcoholic drinks	Chili sauce and spices	Pepper
Cayenne pepper	Mustard	Pickles

As soon as healing has become apparent and the sutures ha been absorbed, all varieties of food are allowed.

Proctitis.—Discussion.—The diet depends upon the length time the lesion has been in existence and the etiologic factor of t disease. When bleeding has extended over a length of time, t patient may present a secondary anemia. If the bowel moveme are very frequent the patient will have lost weight, and in the cases a diet to increase the weight and strength is necessary. the early stages of the disease a bland diet is recommended. Ref to list of Bland Foods.

Advised.

Arrowroot pudding	Custards	Lima beans, blanched
Barley	Eggs, soft-boiled, coddled, scrambled or omelet	Meats, including bacon, well-cooked
Breads and crackers	Farina	Potatoes, baked, boiled or mashed
Butter	Gelatin preparations	Ralston
Cheese	Gruels	Rice, boiled
Cornstarch preparations		Tapioca
Cream of Wheat		

Omit.

Alcoholic beverages	Highly seasoned foods
Carbonated beverages	Olives
Coffee	Raw fruits
Condiments	Vegetables, unless puréed
Fried foods	

Suggestions.—It is common to see patients suffering from fre quency of bowel movements varying from 5 to 20 stools a da Milk may or may not be indicated, depending upon its action o the patient.

When the inflammation is of an acute nature, acidophilus mil and buttermilk should be tried as they have a tendency to chang the flora of the intestine.

Patients should have a thorough procto-sigmoidoscopic exam ination done at frequent intervals to determine the progress of th disease.

Medicated enemata for irrigating the lower intestinal tract a employed together with a dietary regimen.

When the hemoglobin is very low the oral administration of live liver extract and iron, together with foods high in copper an manganese, have proved valuable. The following foods are to b *recommended:* cocoa with cream, peas, molasses, wheat bran, b nanas, liver, chicken gizzard, sweetbreads, oysters, and bitter cho late. With the reduction of tenesmus and abdominal cramps t gether with the increase in weight and a diminution of bowel mov

the patient gradually improves and a less restricted diet ien be given. Refer to Anemias and Ulcerative Colitis.

itus Ani.—Discussion.—Many patients complaining of an ctal itching indulge in rich, heavy foods. These patients all in of an itching which may vary in degree and intensity, ing from fifteen to thirty minutes, located at or near the al region, and which becomes worse about bedtime.

he early stages, pruritus ani is regarded by many proctologists mptom and not a disease entity. An attempt must be made e out all ano-rectal pathology before treatment is instituted. iated lesions such as vaginitis and fungus infection of scrotum highs must be treated. Many of these patients manifest ic reactions particularly on opposing skin surfaces over the body. Because of the complex and frequently undetermined gy a rigid diet plays a very prominent part in the treatment of tis ani.

sed.

gs
rmented and acidophilus milks
sh, boiled or broiled
uits, raw or cooked
Green vegetables
Meats, boiled, roasted or broiled
Water, especially alkaline
Potatoes

t.

lcoholic drinks
akes
atsup
Iustard
Pickles
Pies
Puddings
Shellfish
Spices and highly seasoned foods
Strawberries
Vinegar

it.

reads
andy
andied fruits
heese
offee
reamed foods
Cornstarch
Doughnuts
Figs
Honey
Jams, marmalades
Nuts
Peppers
Syrups
Tea
Tomatoes

Typical Menu.

akfast:
ruit
gg, except fried
oast *or* roll with butter
Iilk or coffee substitute with milk and sugar

cheon and Dinner:
Ieat *or* fish
ooked vegetables
alad
tewed fruit
Iilk or buttermilk

uggestions.—Frequently, fermentation sets up a catarrhal inflamtion in the lower bowel, resulting in the formation of flatus and l secretions which increase the itching.

Constipation and straining at stool may act as a factor in obs
ting the venous return flow through the hemorrhoidal veins. M
eral oil on retiring will help greatly to eliminate constipation.

Diabetes should at all times be ruled out by frequent u
and blood-sugar determinations.

Local pathologic lesions of the anus such as fistulae, fiss
infected anal ulcers, cryptitis, ulcerated hemorrhoids with sl
etc., should be eliminated by surgery.

RICKETS

VINCENT LARKIN, M.D.

Rickets is a disease of infancy and childhood resulting from
ficiency of vitamin D. The vitamin D may be lacking either a
result of an inadequate diet or from lack of exposure of the ski
the ultra violet rays of the sun. It is more common in cold and
elevated climates for the sunlight there is deficient in ultra vio
rays and the need for clothing prevents these rays from reachi
the skin. The average diet of the infant is deficient in vitamin
except for egg yolk, fatty fish, and enriched milk. The infant ha
relatively large requirement for vitamin D because of the factor
growth. Nevertheless severe rickets is rare in this country at t
present time although mild forms (sub-clinical) are frequent
older children. This mild form, however, may be detected on
upon microscopic examination of the bone.

The mineral supply in the diet is a second factor which influenc
the occurrence of rickets. Lack of calcium, phosphorus or bo
intensifies the severity of rickets and increases the frequency of t
disease. Spontaneous rickets, as it occurs in infants, is usual
associated with a deficiency of phosphorus in the diet. A clo
combination of calcium and phosphorus, such as occurs in cow
milk increases the tendency to rickets. Phosphorus may be prese
in the diet in a non-absorbable form, phytin (inositol-hexophosphor
acid) which occurs in many cereals. Rickets occurs much less fr
quently in breast fed infants than in artificially fed infants and
much milder when it occurs, although the content of calcium an
phosphorus are much smaller in breast milk than in cow's mil
Obstruction of the bile ducts increases the requirement of the i
fant for vitamin D by 10 to 12 times.

Rickets is more frequent in highly civilized countries where t
diet tends to be artificial. Infants in tropical climates rarely devel
rickets because they are exposed to sunlight. Eskimo infants, wh
receive practically no ultra-violet rays of the sun are protect
from rickets by their large intake of vitamin D in the diet (fis
and by the fact that they are exclusively breast fed.

Symptoms of rickets develop most frequently after the age o
two months and the highest incidence is from three to sixte
months of age. The incidence of rickets decreases after sixte
months of age, but mild sub-clinical forms persist throughou

…d and adolescence in about ⅓ of the children in this country. … is rarely congenital, this form being found only in infants … a mother with osteomalacia, the adult form of rickets.

…ature infants, twins, and triplets are subject to rickets …nd in more severe forms than are full term infants because …apid growth increases the need for calcium and phosphorus …he premature birth deprives them of the necessary stores of …naterials. In addition, premature infants may suffer from …ty to absorb fats, fat soluble vitamins, and minerals.

…hology.—The greatest abnormality of growth in rickets is … at the cartilage-shaft junction of the long bones. Prolifera… …artilage at the end of the bone swells and the cartilage cells … degenerate as they approach the zone in which bone forma… …s occurring. Failure of these cartilage cells to degenerate …rs them resistant to invasion by capillary buds with result… …regular destruction of cartilage cells and irregular formation …teoid tissue. The columns of cartilage cells also lose their …r parallel growth. Calcium salt deposition decreases and …y stops entirely.

…hen healing of the rickets begins, the growth of bone and tissue …ication return immediately to normal. There is first a deposi… …of calcium salts in the matrix of the cartilage cells bordering …listurbed zone of growth. The normal cycle of degeneration of …lage cells begins again, capillary tufts again invade the columns …rtilage cells in regular order and osteoblasts convert the matrix …e cartilage columns into osteoid tissue.

…athological Chemistry.—Disturbance in the level of calcium … phosphorus of the blood develops. The serum phosphorus de… …ses to 2.0 to 4.0 mg. per cent in most instances but occasionally … the calcium may be decreased. In some cases of rickets both …ium and phosphorus in the blood are decreased. Calcium ex… …on in the normal infant is predominately in the stool (90 to …er cent) while most of the phosphorus excretion is by way of …urine. In the rackitic child there is an increase in the amount of …um excreted through the stool and a decrease in the very slight …unt of calcium that is normally excreted in the urine while …phorus excretion also increases in the stool and decreases in …urine. Blood phosphatase is increased in rickets up to 20 to 60 …ansky units. The phosphatase level in the blood returns to …nal during the treatment of rickets.

…mptoms.—General symptoms of ill health may be noted at the …nning of rickets in young children, such as restlessness, head …ting, irritability and recurrent attacks of mild diarrhea. The …l infant, however, usually displays no evidence of ill health …e onset of mild rickets. Craniotabes, a softening of the outer … of the skull most frequently in the occipital region and in …icinity of suture lines, is the first sign of rickets in the small …t. Later, beading of the ribs and enlargement of the wrists … become visible. Older infants develop bossing of the frontal …, rackitic rosary, enlargement of the wrists, enlarged persist-

ently open fontanelles. Muscles become flabby and weak and child is delayed in sitting, standing, and walking. Toward the of the first year, craniotabes disappears, but other deformities come apparent, the head tends to be square, dentition is delayed, pigeon breast, pot belly, Harrison's groove appear. Further formities of bones, such as spinal and pelvic deformities, bow knock knees, saber shins, and flat feet, depend upon the nature the stress put upon the bones by the pull of muscles, the effect gravity, and the posture of the child at the time of the rickets.

Treatment.—Vitamin D with or without ultra-violet light the is generally used to prevent and to cure rickets. Doses of vita D capable of preventing rickets (400 I.U.) will also cure rickets, very slowly. This quantity of vitamin D is contained in 1 teaspoon ful of plain cod liver oil and in 1 quart of most vitamin D mi The average case of rickets requires 1200 I.U. of vitamin D per and the cure is fairly well advanced on this dosage by the end three weeks. Many patients, however, require considerably lar doses of vitamin D and these patients must have the quantity vitamin D increased gradually until signs of healing of the rick appear. The dosage of vitamin D may have to be increased to high as 50,000 I.U. daily and in rare instances of vitamin D resista rickets as much as 500,000 to 1,000,000 I.U. daily may be used.

If tetany is present as a symptom of rickets it is generally a visable to administer calcium salts orally for two days before b ginning treatment of the rickets with vitamin D. When vitamin is given first in these patients there is a slight chance that the ca cium in the blood will be further reduced by the action of the vit min D and the tetany increased. Calcium chloride may be giv in amounts of 3 to 4 grams as the initial dose followed by 1 gram times daily for a week. The solution of calcium chloride should n exceed 5 per cent in strength since more concentrated solutio produce intense gastric irritation and occasional gastric hemorrhag

Rickets may also be cured by the administration of a single lar dose of vitamin D orally. The dosage advocated is a minimum 600,000 I.U.

Rickets may also be cured without the use of vitamin D or ultr violet light. A mixture of citric acid and sodium citrate has be found to be curative of rickets in exactly the same fashion as vitam D, and produces very rapid healing. The dosage recommended 40 ml. of molar citric acid and 20 ml. of molar sodium citrate dail

SCURVY.

Discussion.—The story of scurvy is one which is closely associat with the sea and dates as far back as the institution of writin Infantile scurvy (Barlow's disease) was described by Barlow 1883, at which time he differentiated scurvy from acute ricket

It is a disorder of nutrition, due primarily to the lack of vitamin caused by a deficiency in fresh fruits and green vegetables. view of the fact that it takes approximately six months of relati or complete vitamin C deficiency before symptoms are produce

equently scurvy in its incipient stages remains undiagnosed. s particularly true where fresh fruits and green vegetables ailable, but, due to distaste on the part of the patient, have en incorporated into the diet. In this way, it is possible to ve that many people are suffering from what might be called nical scurvy.

er to Vitamin C (page 79) for further discussion and for s of this vitamin.

SCURVY, INFANTILE

VINCENT LARKIN, M.D.

antile scurvy is a deficiency disease which results from lack amin C. It occurs more frequently in artificially fed infants in breast fed infants because of the smaller amount of vitamin cow's milk. It is less frequent in rural areas than in large cities use there is a shorter time between production and consumption e milk in rural areas, with a decreased loss of vitamin C in the .

iology.—Deficiency of vitamin C is generally accepted as being cause for the symptoms of scurvy. However, other factors may a rôle which is at present not completely understood. The irement for vitamin C is not known with exactness. According tefansson, primitive people subsist on diets containing such small unts of vitamin C that theoretically they should have scurvy, reas they are actually in robust health. Diets which are de- nt in vitamin C cause a decrease in the body stores of vitamin C ng the first two weeks, but there is a transient rise in the body es of vitamin C during the second 2 weeks, although the diet tains no vitamin C. Also, some cases of scurvy do not respond to rbic acid therapy, but improve immediately when given orange e or lemon juice, a fact which suggests that some unknown factor ecessary for the utilization of vitamin C.

ncidence.—Scurvy is more frequent in infants than in adults use infants receive more restricted diets. In many instances have been given no food containing supplementary vitamin C r a period of months. Most of the cases occur between the ages ight and thirteen months but may occur before or after these . The disease is rare in children over eighteen months of age. nts who are breast fed exclusively rarely develop scurvy because breast is able to concentrate vitamin C in the milk even when maternal supply is low. Even in children with debilitating onic diseases, scurvy rarely occurs because most of these infants given concentrated vitamin supplements which contain adequate unts of vitamin C. Only gross neglect of the diet causes scurvy his country at the present time. The disease has become almost -existent in this country because of modern feeding habits.

athology.—Hemorrhage results from the decreased capillary stance and the permeability of the capillary walls which occurs

in the prolonged absence of vitamin C. There is no spec ficiency in the clotting mechanism but rather an extravasat blood through the capillary walls. The hemorrhagic lesi from petechiae to extensive ecchymosis. In the skin, the he rhage occurs about the hair follicles, sweat glands, skin le bony prominences and other points of pressure. Hemorrhage also occur in the internal organs. Skeletal lesions also occur are most common at the costo-chondral junctions, the distal e the femor, the proximal ends of the tibias and femors and the wr In the bones there is normal calcification at the zone of provis calcification but capillary buds do not invade this zone as t normally should and there is failure of conversion of this ne calcified osteoid tissue to bone. Blood calcium and phosph remain normal but blood phosphatase is greatly decreased.

Symptoms.—The symptoms of early scurvy are anorexia, ritability, failure to gain in weight, and occasionally recurr diarrhea. As the disease progresses hemorrhages become visi the infant cries constantly, lies motionless and screams when h lifted. In the order of frequency the most common symptoms are pain in the lower extremities, particularly when the patient is diap ed, resulting in refusal to stand; changes in the gums, particula where teeth are erupting; hemorrhages of the skin; and fev Musculature is flabby and weak. *X*-rays of the long bones show increased density at the ends of the long bones with a ground gl appearance of the bone. Sub-periosteal hemorrhages may present.

Therapy.—Scurvy may be cured by the oral administration orange or lemon juice; 4 ounces of orange juice (containing milligrams of ascorbic acid) taken daily produces a remission symptoms within a few days. Healing is complete over a two we period. If the disease is very severe ascorbic acid may be giv orally, intravenously, or intramuscularly. Doses larger than 1 milligrams daily are rarely required in the treatment of scurvy.

SEBORRHEA.

Refer to page 308.

SPRUE (THRUSH).

Discussion.—Sprue or psilosis is a disease found most frequent in the tropics and sporadically throughout the rest of the worl It is characterized by a sore mouth and tongue, severe diarrhea a secondary anemia. The etiology is unknown: most authoriti however, classify it as a food deficiency.

Formerly, various diets have been tried with a fair measure success in the treatment of sprue. Milk, so much as 3 quarts twenty-four hours, at two-hour intervals, has been used with varying degree of response. This regimen can be met by the pr scription of a modified Sippy diet. Refer elsewhere for detai Frequent feedings of large amounts of meat very slightly cook

o been tried. Some observers have found that fresh straw-
ive marked relief. However, permanent cure has been very
ler these conditions and recurrences frequent and severe.
ently the use of liver in the treatment of this disease has
ry successful. When large amounts of liver by mouth are
ctive, liver extract given intravenously and intramuscularly
duced excellent results. Remission is brought about quickly
continuous use of the liver extract, patients continuing
health for long periods of time. Refer to Pernicious Anemia
ondary Anemia for modes of liver administration.

STENOSIS, ESOPHAGEAL.

ussion.—The type of diet for this condition varies directly
he degree of obstruction present. The common division
s itself into a fluid or semi-fluid diet. One or the other of
wo diets is indicated irrespective of the determined etiology.
following diets are arranged for both the liquid and semi-
types, yielding sufficient caloric value to be above minimal
naintenance.

Liquid Diet.

Typical Menu.

fast:

it juice
uel with cream and sugar
ffee with cream and sugar *or* cocoa

M.

gnog, buttermilk *or* milk

heon:

eam of vegetable soup *or* strained soup
stard, junket or ice-cream

.

uit juice with beaten egg

er:

eam of vegetable soup *or* strained soup
in custard, sherbet *or* fruit-ice

.

t milk *or* cocoa

Soft (Semi-liquid) Diet.

Typical Menu.

kfast:

uit juice or puréed fruit
ained cereal with cream and sugar
g, soft-cooked
ffee with cream and sugar *or* cocoa

Soft (Semi-liquid) Diet.—*(Continued.)*

Midmorning:
Buttermilk, milk, eggnog
Luncheon:
Minced meat in cream
Puréed vegetable
Soft dessert
Milk
Midafternoon:
Fruit or vegetable with beaten egg
Dinner:
Minced meat in broth
Mashed potato
Puréed vegetable
Soft dessert
Milk
Bedtime:
Hot milk *or* cocoa

Suggestions.—In view of the fact that there is a limited volumet intake, water may be entirely omitted and the requisite liquid obtained from those fluids with caloric value, such as milk and modifications. Refer to Fluid Foods, Soft Foods and Supplementa Methods of Feeding.

STERILITY.

Refer to page 410.

STOMATITIS, ACUTE.

Discussion.—In the early stages of acute stomatitis or severe aff tions of the oral cavity, the following fluids are *recommende* albumen water, barley water, bouillon, broths, buttermilk, co sommé, cracked ice, ice-cream, Kaffee Hag, milk, orange albume Postum, rice water, Sanka, soups, gruels, weak coffee and te Refer to Fluid Foods.

The administration of these foods should be very frequent a limited in quantity. Either lukewarm or ice-cold foods are w tolerated. In the event that one is not borne so well as the oth further restriction of the noted items can be instituted.

At a later period the diet may be augmented by the followi foods: apple sauce, baked apple, minced chicken, custard, shredd fish, junket, mashed potatoes, poached eggs, puréed or strain vegetables, sherbets, soft-boiled eggs, toast. Refer to Soft Foods.

Some physicians object to the feeding of milk or milk produc in cases of stomatitis. However, the few detrimental effects observ are relatively negligible and insufficient to warrant milk deprivatio Reference should be made to the liquid diets suggested in Esoph geal Stenosis and Febrile Conditions, for further menu suggestion Refer also to Oral Conditions and Diseases.

SURGERY IN DIABETES.

Edward C. Brenner, M.D.

ussion.—According to conservative estimates there are over 00 diabetics in this country. What proportion of these, the course of their disease, will require surgical treatment ssible to foretell. However, we may evaluate the frequencies agnitude of their surgical pathologies when it is recalled that 2 to 15 per cent of all diabetics who enter hospitals are admitted rgical complications.

clinical reasons these patients may be divided into two groups: ose of *election*, in whom the surgical pathology is in no wise l to the preëxisting diabetes; (*b*) those of *necessity*, in whom rgical complications are directly or indirectly resultant upon rsistent hyperglycemia.

Cases of Election.

or to the advent of insulin therapy (1921) the conservative on held aloof from operating upon such patients unless the logy was of acute or disabling severity. Patients suffering diseased gall-bladders and appendices, intractable chronic ic and duodenal ulcers, herniæ, pelvic pathologies, etc., were sed against operation. In the best hospitals the mortalities diabetic surgery were from 20 to 40 per cent. Fortunately, no longer obtains and the general practitioner should know nd peradventure of doubt that, *in the absence of infection*, the cal risk in skilled hands, with proper medical care before and operation, is no greater for the diabetic than it is for the non-etic patient of the same age and general physical condition.

rgical cases of election may be managed as follows: (1) Deter- the practicability of relieving the hyperglycemia, with or with- acidosis, by diet and insulin. (See Diabetes.) It should be mbered that in the absence of acute infection the sugar toler- is not influenced by operation. (2) Appraise the patient's ral constitution. If surgery is indicated and the diabetes is ght under control, a constitutionally competent patient may iven about the same prognosis as the non-diabetic. Wounds in the same time and the surgical convalescence is not pro- ed.

owever, certain precautions should be taken. A few days e operation the carbohydrate intake should be increased, and, cessary, the insulin as well, so that the glycogen storage in the may be at its maximum.

e question of *anesthetic* is important. Chloroform should r be used. Ether is also contraindicated as it increases the l sugar and produces acidosis through diminution of normal ation. Moreover, the urinary output is decreased and the tion of acetone bodies diminished. The frequent vomiting tuates the acidosis. The effect of insulin upon carbohydrate

metabolism is largely neutralized when the organism is saturat with ether. Novocaine-block anesthesia holds first choice. F abdominal and pelvic surgery most surgeons favor spinal anesthe with pre-operative selection of morphine and atropine. In low extremity pathologies, either spinal anesthesia or refrigeration the part is the method of choice.

For general anesthesia nitrous oxide and oxygen or ethylene a preferred. A preliminary hypodermic of morphine, $\frac{1}{6}$ to $\frac{1}{4}$ grai with atropine, $\frac{1}{200}$ to $\frac{1}{150}$ grain, is a decided adjuvant. To atta further relaxation curare may be employed.

Post-operatively in non-diabetics it is a frequent custom followi laparotomy to administer glucose solution by rectum. In diabet patients this procedure is too indefinite. Excellent results a obtained by giving definite dosage of glucose by intravenous infu sion. Three to 5 per cent glucose in normal saline is *slowly* infuse into the vein (usually at the elbow), using 1 unit of insulin to grams of glucose. Needless to say, the solution must be kept war during the entire infusion. Not more than 50 grams are given a time. The usual procedure is to administer 500 to 1000 cc. 5 per cent glucose in sterile normal saline with the proper units insulin added thereto, every four to six hours, as indicated. I cases of kidney insufficiency the saline is omitted and the gluco is given in sterile water.

Chronic cholecystitis with or without stones deserves speci mention. The question of chronic cholecystitis in the productio of chronic pancreatitis and possible resultant diabetes is not germa to this discussion of therapy. However, it has been definite proved that infections lower the diabetic's sugar tolerance and gal bladder infection is no exception. Striking improvement in th diabetes occasionally follows cholecystectomy.

Most cases of gall-bladder disease occur in overweight, middl aged individuals, the same class in which mild diabetes is so commo These cases are favorably influenced by operation, perhaps large through the removal of a focus of constant infection. In genera it may be stated that the indications for gall-bladder surgery a the same in the diabetic as in the non-diabetic. With proper pr medical care, the operation is safe and the subsequent effect upo the diabetes often favorable.

Herniæ in diabetes present a different problem. There is n infective element and the problem is chiefly one of the patient discomfort. Several factors other than the diabetes must be con sidered: the age of the individual, the occupation, the type and si of the hernia, especially whether reducible or irreducible, also an tendency toward inflammation or irreducibility, digestive disturb ances and, last but not least, the general musculature.

Patients past middle-life with reducible herniæ are best treate with a properly fitted truss. This should be applied before risin in the morning. Needless to say, a truss should never be wor over an irreducible hernia. Patients whose occupations enta marked increase of intra-abdominal pressure should not be operate upon. In these the danger of recurrence is large. Those with very

musculature, especially the obese with large direct herniæ, oor candidates for permanent cures. The group of middle-patients (the majority) with irreducible herniæ, especially concomitant digestive disturbances, are best operated upon novocaine-block anesthesia. Those more advanced in years become surgical if definite obstruction occurs. Strangulation y age knows no mercy but the scalpel.

pendicitis is a common problem in the diabetic. A word of ing should be emphasized. A diabetic with his sensorium d by acidosis often tolerates pain and inflammation with little plaint. The writer has had 2 such cases go on to abscess ation who had refused operation because they had hardly any . On the other hand, two other conditions may occur in a etic which may simulate an acute abdominal condition. One e abdominal discomfort, sometimes severe pain, of a hypo-emic reaction; the other, severe abdominal pain with vomiting diffuse abdominal tenderness, which may occur in the early e of diabetic acidosis. A pre-operative urinalysis should always one.

he acute appendix is not to be temporized with unless it is nitely subsiding when seen. If rupture and diffuse peritonitis ne the mortality is much higher than in the non-diabetic. The sner treatment for peritonitis is contraindicated as statistics eal a prohibitive mortality. In peritonitis cases, if one waits to trol the hyperglycemia and acidosis, these may be improved the patient will succumb. With sugar in the peritoneal cavity, teria grow with astounding prodigality. Furthermore, the value nsulin is decreased more than 50 per cent in the presence of ction. When drainage is established the efficacy of insulin urns.

astric and duodenal ulcers in the diabetic and the non-diabetic uld be given a prolonged course of medical treatment. The gical indications are in general the same as in non-diabetics with reservations enumerated in the paragraph of cases of election.

ynecology in Diabetics.—Infection of Bartholin's glands, Skene's nds and of patients with endo cervicitis lower the diabetic's ar tolerance and should be cured by appropriate palliative asures. Surgery should not be advised in patients with cystocele anced and the patient only mildly diabetic. Cases of extensive vical laceration with concomitant infection are perhaps best ated by endo thermic conization.

ibroids not larger than a grapefruit and producing symptoms nenorrhagia or pressure, in which there is no adenexal inflamma-n, respond well to radium. Larger growths may require hy-ectomy. Malignancies of the cervix or body of the uterus uld receive the same therapy as in non-diabetics.

Pyosalpinx and tubo-ovarian abscess present relatively the same blems as in the normal patient. The infective element will uence the power of insulin to control the carbohydrate metabo-n. Chemotherapy is usually effective.

Hyperthyroidism.—About 1 per cent of the cases of hyperthryoid

ism are complicated by diabetes. Whether hyperthyroidism ca diabetes is a moot question. The hyperthyroidism accent the diabetes, increases the danger of acidosis and renders less effective. Iodine therapy, usually given as Lugol's sol helps the hyperthyroidism and, indirectly, the diabetes. Roent therapy is a valuable adjuvant. If rest, sedatives, iodine a radiation fail to control the hyperthyroidism, surgery is indicat In many cases the diabetes is ameliorated in a manner similar that obtained in removing an infection of considerable magnitu

Cases of Necessity.

Furunculosis.—Diabetics are especially prone to furuncles. Th dry skin, predisposes to the invasion of hair follicles by surfa bacteria. These apparently trivial surface infections require i mediate surgical treatment as they may progress to deeper infectio of serious magnitude. Small superficial furuncles and boils may painlessly treated as follows: The skin for about 1 cm. surroundi the infection is painted lightly with tincture of iodine and swabb off with 95 per cent alcohol. A droplet of pure carbolic acid applied to the dome of the furuncle. This produces sufficie anesthesia to make painless a small crucial incision through whi the pus is evacuated. *Do not squeeze the boil.* This pernicio practice leads to the formation of secondary furuncles. The ha zone about the follicle infection is Nature's protective barrier leukocytes. Squeezing may break down this first line of defens When the pus is evacuated it should be swabbed off with 95 p cent alcohol. A wet dressing of Dakin's solution or 5 per ce alcohol or 1 to 500 potassium permanganate should be applied f twenty-four hours. Over the wet dressing a hot-water bottle electric pad often adds relief. The antiseptic wet dressing preven infection of the neighboring hair follicles. The writer prefers open boils with the endotherm needle and sterilize the contents b coagulation. The results are excellent in both boils and furuncles, skilfully performed. Chemotherapy should be instituted promptl

Most boils are incised under 1 to 2 per cent novocaine anesthesi The object of the anesthesia is to produce a novocaine block *abo* and *not into* the boil. After the area has been painted with tinctu of iodine, mercurochrome, etc., the first insertion of the hypoderm needle may be rendered painless by applying a small droplet pure carbolic acid to the site of puncture. Once the tip of th hypodermic needle enters the skin, the solution should be injecte in advance of the needle. Under no condition insert the need into the boil as its withdrawal may infect the surrounding tissu The anesthetic should be injected circumferentially about the bo Attention to these details will render what is often a very painf procedure quite tolerable. Larger boils and especially those i the axilla are best incised under gas or gas-oxygen anesthesia. I all cases the incision must be radical enough to obtain adequat drainage. It must always be remembered that infection has harmful effect upon diabetes and demands prompt treatmen

less of acidosis. Treat the infection first, then the diabetes. prevent recurrent furunculosis scrupulous cleanliness of the must be maintained and the hyperglycemia controlled. Some e a larger carbohydrate intake, compensated by increased n dosage, is advantageous. Vaccines, either stock or autog-, are sometimes efficacious. It should be remembered that patient with recurrent furunculosis, even in the absence of suria, should have a blood sugar done, as many such cases are ing from a low-grade hyperglycemia.

scesses and cellulitis demand immediate attention. In patients acidosis, these should be sought for on the back and buttocks ten their threshold of pain sense is greatly lowered.

onic leg ulcers are commonly found in those of advanced , especially with arteriosclerosis. Usually the skin surround-he ulcer is mildly infected. Excellent results are obtained by ng the patient in bed, elevating the affected extremity on ws and applying a continuous wet dressing of normal saline, n's solution or dichloramine-T. Lead and opium solution is rred by some.

ith proper carbohydrate balance, the infection usually subsides kly, and once the ulcer becomes free of infection its healing follow the application about its borders of stimulants such as r cent scarlet red ointment, balsam of Peru, etc. Occasionally e granulating ulcers require Thiersch or pinch grafts.

nother type of ulcer, less common, is the perforating one. This nbles that of tabes dorsalis and usually is accompanied by e involvement, producing areas of anesthesia. These ulcers very sluggish and often involve the deeper parts, producing omyelitis. For the ulcer *per se* the best treatment is exsection suture of the soft parts.

arbuncles.—These require immediate surgical treatment. The nique varies among different surgeons, but all agree upon the inal principle of a radical incision to obtain adequate drainage. ny operators make a large crucial skin incision under gas-oxygen thesia and completely excise the contents, preserving all skin h is healthy. The cavity left is packed with gauze and Dakin-until clean. Recently at the Post-Graduate Hospital, New k, the writer has attempted sterilization of the multiple abscesses electric coagulation with several excellent results. This treat-t is relatively painless and no anesthetic is necessary. Those iring exsection of the infected zone were treated with the endo-m knife and better results were thought to obtain. Chemo-apy is a powerful adjuvant.

abetic gangrene occurs most frequently in patients who have red from a mild diabetes for many years. It is uncommon in ng dividuals and is seen in those past fifty years of age who a concomitant arteriosclerosis. Many cases of so-called dia-gangrene are really those of senile or arteriosclerotic gangrene. ically, we classify the dry gangrene as arteriosclerotic and the t gangrene as diabetic.

Prophylaxis. Gangrene usually affects the lower extre
beginning in the toes, sole of the foot or on the heel. Th
sign of impending danger is often a paresthesia or a troph
turbance. This is a warning of imminent trouble. If in the
the feet should be kept scrupulously clean by daily prolonged wa
bathing, the nails carefully cut and any corns or bunions kept
with lanolin. Wool socks should be worn with properly fit
shoes. Caustics and strong antiseptics should be avoided. In
red rays are helpful. Often the first lesion is a small blister.
these cases the patient should be ordered to bed at once and k
there, the part elevated and kept continuously warm. If the b
ter persists, its contents should be evacuated and a mild antise
dressing of Dakin's solution or dichloramine-T applied.

If actual gangrene develops and the parts remain dry, and th
is no redness of the surrounding skin and no signs of lymphangi
expectant treatment may be maintained. The dorsalis pe
popliteal and femoral arteries are carefully palpated for pulsat
and compared with the opposite leg. The acidosis and hyp
glycemia should be rigidly controlled. Occasionally and in
types only, Nature will indicate its line of demarcation and
site for amputation. However, in the moist (most common) ty
of gangrene, in which there is redness of the surrounding skin a
a beginning lymphangitis, immediate surgery is imperative. Te
porization with these cases usually results in death from septicem
or bronchopneumonia.

In wet gangrene of the toes or sole of the foot it seems radical
perform amputation above the knee, but those with early hi
amputation have a mortality correspondingly low. The lymphat
are infected higher in the leg than the lesion would indicate a
an upper calf amputation usually ends in an infected wound and
fraught with grave danger. A mid-thigh amputation perform
promptly produces the best results. In cases where there is exte
sive lymphangitis the stump should be left wide open. A blo
culture should be taken in all cases.

Whereas coma was the principal cause of death in the diabet
with the advent of insulin it has taken second place to diabe
gangrene and its sequelæ. This mortality should be materia
reduced by insistence upon unremitting prophylaxis and prom
high amputations in cases of wet gangrene with lymphangitis. Re
to Diabetes Mellitus for specific dietary management.

SURGICAL CONDITIONS

R. Franklin Carter, M.D.

Discussion.—The tendency of surgeons today is to mainta
during the surgical period the daily required ingestion of food
the patient at a level as nearly normal as possible. The norm
intake of food by mouth is necessarily interrupted during t
operative period in every major surgical procedure. Preparat

patient for this interruption is carried on by the routine g of extra carbohydrate and the normal amount of protein veral days prior to operation. Hard candy in addition to the l intake of ordinary carbohydrates, extra starches and sugars with the diet, is used for this purpose. For maintenance of le protein, jello, cheese, skimmed milk, and, in some instances, lly prepared proteins, are added to the dietary. In cases which t require special preparation, the patient should be specific- nstructed to eat the usual amount of food up to the day of tion. The old custom of starving before being operated upon is prevalent and may be encountered in any and all types of nts. During the operative period (this includes the day of tion and two days following), the intake of carbohydrates ld be carefully maintained. To maintain the carbohydrate nce, 5 per cent glucose in normal saline is administered intra- usly until there is a re-establishment of the normal intake of substances through the usual channels. The addition of ially prepared protein by oral and intravenous administration is indicated in the average case. Resort to this type of intraven- protein feeding is indicated, however, and very helpful in those ents having had loss of weight, long periods of starvation or aft- aving undergone chronic illness, or for any other reason having a serum protein.

'henever it becomes necessary to continue intravenous glucose salt administration, vitamin B_1 should be furnished to the ent. In general, the use of highly refined carbohydrates is un- rable for any great length of time unless accompanied by an quate supply of vitamin B complex.

ollowing operation, the normal intake of carbohydrates and teins together with fluids, equal to or above the normal, should resumed by mouth within forty-eight hours, except where cially contra-indicated by the type of operation.

ince surgical procedures lower the plasma vitamin C concen- ion 30 to 50 per cent, the addition of 200 to 500 mg. of ascorbic l to the diet is recommended daily prior to and after operation. hough there is no substantial proof that vitamin C deficiency rs in non-union of wounds, the evidence is such that this vitamin ld be employed after major procedures in debilitated patients when early rising after operation is practiced.

'herever circumstances permit, and especially for patients with ous surgical procedures ahead, a chemical blood analysis should nade for determination of the carbon dioxide combining power, r, chlorides and urea, also a blood count from which the nu- onal state of the patient will be determined and adequate sures instituted for the preparation and care during the operative od.

reliminary use of cathartics very much interferes with carbohy- e and water reserve, and should be omitted unless special prepa- on is required. Some surgeons advise the patient to use an tional amount of salt in their food for several days prior to

operation. In those patients taking little fluid this practice is u ful. This salt intake can be augmented by the administratio single O capsules which can be packed with ordinary table Two of these capsules three times daily should be given.

The natural vehicle for the introduction of carbohydrates water, which is required for purposes of metabolism just as much carbohydrates. Therefore, the soluble carbohydrates should administered along with tea, orange and lemon phosphate mouth; intravenously in glucose, 5 per cent, intravenously as p glucose in 10 to 15 per cent solution made up in normal saline a sterile water solution when glucose is especially required in lar quantities. The average daily intake should be maintained exceeded, especially in the amount of fluid.

Diets in Specific Conditions

Anemias.—The preliminary preparation of anemic patients sho be by diet and the usual medical measures whenever the nature the case will permit operative delay for this purpose. For the rel of anemia, blood transfusion is considered transitory and not satisfactory as a natural increase in the patient's own blood elemen Medical methods should not be used for patients with cancer n those with a hemoglobin below 60 per cent, but blood transfusio should be employed.

The secondary anemia encountered in young women accompani by undernourishment, low blood-pressure, etc., should be treated high-calorie, iron, copper and manganese diets, with liver or liv extracts, judicious exposures to sunlight, injections of iron and e forced rest for a month to six weeks prior to all elective operatio for pelvic disorders, herniæ and chronic abdominal conditions. F acute cases of this type, a post-operative regimen of the same so is very essential, and it should never be neglected in order that t patient may fully recover and receive the full benefit from t instituted surgical procedure.

For patients with secondary anemia of a severe grade, *ri* hemoglobin below 40 per cent from bleeding hemorrhoids, meno rhagia or bleeding ulcer of the stomach or duodenum, prelimina blood transfusions of whole blood, sufficient to raise the hemoglob to above 60 per cent should be employed immediately prior to t operation. Following the operation the high-calorie high prote diet with blood-producing agents, iron injections and enforced re will suffice.

The severe degree of secondary anemia that stimulates t pernicious type which is encountered in patients with carcinom and especially when the cardia of the stomach or the ascending col is the seat of the disease, should be relieved by large transfusio of whole blood both before and after operation. This may then b followed by the usual dietetic and other methods of stimulating t hematopoietic system.

Nephritis.—In the presence of nephritis, a special dietary regime should be instituted prior to operation in all patients having chron

ive surgical conditions. Specific diets for the various types ritis should be instituted and carried on until the effects of is have been eliminated insofar as it is possible before eration is attempted. Refer to Nephritis-Bright's Disease. r to operation the attention to and provision for an adequate ydrate, protein and fluid reserve is especially indicated, as atients have more than the usual amount of toxins to elimi-

nephritis that accompanies severe thyrotoxicosis is of especial tance to the surgeon. Preliminary preparation by blood es and correction of high nitrogen retention prior to operation l be attempted wherever the condition of the patient permits, vhere improvement takes place in the presence of a decline in yrotoxicosis. However, in the face of a severe case which has prepared for operation, the operation should not be delayed se of an accompanying nephritis, rather the anesthetic choice l be made with a view toward conserving the kidney function r as possible.

e accompanying nitrogen retention of conditions of intestinal uction, obstruction of the common bile duct and in acute tions, is important, and it should receive prompt and adequate tion. Operations for the relief of these conditions cannot be ed because of nitrogen retention, albumin or casts in the urine. a renal picture, especially that accompanying acute infection, gely transitory, and the proper attention to water, sugar and ide intake is usually all that will be necessary. A noted ex- on is that type of nephrosis and nephritis which follows the e infections of childhood and pregnancy. Whenever they are untered all operations of an elective nature should be deferred the renal involvement treated rigorously along the usual lines down under that topic. Also all acute operative conditions untered following the acute infections of childhood and preg- y should be accompanied by careful analyses of renal function unusual attention to diet.

esity.—Obese patients are frequently misleading in their ry requirements. They may be oversupplied with a reserve t and still have a small carbohydrate reserve, with which lesome post-operative acidosis, vomiting, general discomfort ore serious complications may ensue. The preliminary excess ng of carbohydrates is essential in all obese individuals,

pecially in obese patients with large abdominal herniæ and cute gall bladder disease, the dietary intake before and during ation should be controlled. Prior to operation the patient ld be put on a diet low in fats, and in a case of a large abdominal ia loss of weight can be attained by a period of strenuous dieting wo months or more before operation. During this time the r and fluid intake should be retained at normal or brought to al for several days prior to operation. Refer to Obesity.

derweight.—The most frequent misleading factor in thin in- luals is the fluid balance. These patients are almost always

dehydrated, and the preliminary administration of fluid with pr and carbohydrate is essential. Generally, during the ope period metabolic difficulties are met with less frequently in individuals than in the obese. Probably this is true because thin individual the necessity for adequate preparation is apparent than in the obese.

It is rarely necessary to defer operation to put weight on a tient, and it will never be necessary except when the underw is accompanied by anemia and asthenia. The patient who has accustomed to a full diet but has not gained, and seems to the normal or accustomed weight, need not be over-fed for periods prior to surgery. Following operation a high-calorie and other measures to increase the weight is of great assistanc insuring a satisfactory end-result. Basal metabolic determinat may reveal valuable information.

Infants.—The careful administration of food up to the opera day and an early resumption of feeding are important, because of rapidity with which the conditions of acidosis and alkalosis app in early life.

The Aged.—A slowing-up of metabolism in old patients ma them less able to detoxify deleterious substances when called u to do so during acute infections. Therefore, an adequate supply carbohydrate, fluid and protein is more often necessary.

Gastro-Intestinal Cases

Gastric.—Three days prior to operation, all alkalies should omitted, carbohydrates added to the diet and the usual starches w an excess of sugar and fluid taken. For twenty-four hours preced operation the stomach should be given rest periods which insure its being empty for five hours prior to operation; during t period nothing should be taken by mouth, not even water, an preliminary gastric lavage should be routine practice, leaving tube in place.

Routine for Patients with Gastric Operations

Operative day, following operation.—The indwelling tube in stomach should be left in. Irrigation of the tube after two ho with 2 oz. of sterile saline will insure against dilatation of the st ach and reveal any unusual bleeding should it occur. Three th sand cc. of 5 per cent glucose solution is the average need. thousand cc. of the solution should be made up in normal saline a 2000 in sterile water. In addition, a great many surgeons use ampule of soluble B complex and 500 mgs. of vitamin C in bilitated patients. One thousand cc. of the fluid should contain of the soluble proteins in especially debilitated patients, and those having undergone protracted operative procedure. F quently, blood transfusion on the day of operation, or the int venous use of plasma is sufficient to replace body proteins.

First day after operation.—The indwelling gastric tube should

...l. Fluids by mouth, 2 to 3 oz. tap water or tea may be given ...tly. The indwelling tube should be aspirated at two or three ...tervals to prevent distention, or the tube may be connected ... intermittent suction apparatus. In addition to what fluid ...e absorbed from that taken orally, 2000 cc. of 5 per cent ... should be administered intravenously, to which is added ...pule of soluble B complex and 500 mgs. of vitamin C. Intra... protein administration, in the form of plasma or a prepared ...t. on this day, may be necessary to keep up the body proteins ...presence of severe weight loss and when surgical shock occurs. ...ousand cc. of the fluid should be made up in saline and 1000 ...ile water.

...nd day after operation.—The gastric tube should be retained. ... by mouth should be increased to 4 to 6 oz; aspiration of the ... tube continued, and the same intravenous medication and ... as for the first day post-operative.

...rd day after operation.– The gastric tube may be removed if ... is no sign of retention of duodenal content in the stomach. ...bile is found in the stomach, fluid by mouth may be started in ...4 oz. amounts every hour. Should no nausea or vomiting ...r for twelve hours, more liquid may be taken by increasing ...mounts to 4 to 6 oz. amounts every hour. If nausea appears, ...ing pulse-rate, the gastric tube should be reinserted and no ...allowed for six to eight hours. In addition, the fluid and glu... should be continued by intravenous administration until the ...h post-operative day.

...urth day after operation.—By mouth, 6 to 8 oz. amounts every ... hours made up of water, tea, strained gruel, blan-mange, cus... milk and water, equal parts. Water between feedings ad lib, dis...nuing fluids upon appearance of nausea or epigastric distress.

...fth day after operation.—Soft diet continued; fruit juice, stewed ...s, double ground meats, mashed or baked potato, soft toast, ...ream, etc.

...rth day after operation.—Regular soft diet.

...venth day after operation.—Regular soft diet.

...ghth day after operation.—throughout hospital stay.

Breakfast:

Cereal with cream and sugar
1 soft cooked egg
Dry toast, buttered
Tea with milk and sugar

Mid-morning:

Whole milk oz. 6

Luncheon:

Vegetable or meat soup, strained
Baked potato, with butter and salt
Puréed peas
Chopped chicken or ground meat
Dry toast
Custard blanc-mange, ice-cream or strained fruits
Whole milk—oz. 6

Mid-afternoon:
Whole milk—oz. 6

Dinner:
2 puréed vegetables
Soft egg
Dry toast
Stewed apples, peaches (put through colander)
Malted milk

Bed-time:
Whole milk—oz. 6

In some patients the tendency for the re-development of ul can be determined from the history of recurring episodes of ul over the given number of years. In these patients it is especial important to keep them on bland diet during the post-operati period. The tendency for marginal ulcer development may materially influenced by diet during this period.

So far, we know of no definite causative factor in patients havi recurring ulcer of the gastroduojejunal margin, and it is wise in patients having a history of pre-operative seasonal attacks hyperacidity and a tendency for recurrence of ulcer to under dietary management during this time.

Gall-Bladder Operations.—For pre-operative and post-operati gall bladder dietary schedules, refer to Gall-Bladder Disease.

Appendectomy.—In chronic and subacute appendicitis, the avera patient requires no preparation except for the period of six hou before operation when diet and fluids should be restricted. R sumption of fluids four hours post-operatively with sugar and, aft twelve hours, a soft diet free from excess fats. Normal diet shou be started on the third day.

Cathartics.—In this condition as in all other abdominal ones, cathartic prior to operation is very much contraindicated. Simpl leaving it out of the pre-operative orders is frequently not sufficien as almost every patient will discuss the coming event with someo who has been operated upon and who has taken a cathartic as part of pre-operative routine; they will advise the patient to tak one likewise, and, as it has happened, the patient may appear f operation with a part of a large dose of castor oil still active in th intestines. This is prone to cause gas pains, nausea and vomitin soon after the operation. Therefore, every patient should cautioned against taking any laxative or purge. Also, it should explained that an enema is all that is necessary before operatio

Following operation, cathartics are equally bad. Most patien do better if all laxatives are withheld for the first week and depen ence put upon relief of gas by rectal tube before the third day a enemata thereafter.

Colon Cases

Four days are necessary for careful preparation with the usu increase of carbohydrate, fluid intake, and an absolute eliminati

esidue from the diet insofar as possible. Refer to Mucous , Amebic Dysentery and Ulcerative Colitis, also Diet in Rectal ions, for menus.

obstructive Lesions.—A cleansing dose of castor oil should be n the first of the four days of preparation. This should be d by the institution of sulfasuxadine, two grams four times a y mouth. Following this, no enema or colonic irrigation be employed; a non-residue diet will suffice. On the day of ion, penicillin, 100,000 units every three hours.

tructive Lesions.—The Miller-Abbott tube has come into use ients of this type when it can be passed successfully. Obion can be relieved and pre-operative preparation carried out nuch similar to that used in the non-obstructive lesions. Upon ccessful passage of the Miller-Abbott tube through the upper nal tract down to the region of the ileum or into the colon, he relief of obstruction, the patient may be prepared for operay the intravenous administration of fluid, glucose, chlorides luble protein, together with vitamin C and soluble B complex, r to the case that is not obstructed.

an example, a patient, admitted with vomiting, abdominal tion and without sign of gangrene and obstruction, may have a r-Abbott tube inserted on admission with the administration 0 cc. of 5 per cent glucose in normal saline, 1000 mg. of vitamin ampule of soluble B complex. This initial administration of , fluid, carbohydrates and vitamin to be followed by additional nts of fluid and food elements, depending upon the length of of obstruction and dehydration the patient has been submitted

this way, many patients are decompressed and the bowel above bstructing site may be restored to a relatively normal state h will permit of one stage operation for resection and anaosis that would have been impossible without the pre-operative aration. This type of preparation is not always possible be- of the difficulty in passing the Miller-Abbott tube. Failure to the tube for eight hours should indicate the necessity for ration and surgical relief of the obstruction, with the additional ures for relief of intestinal obstruction by intravenous therapy ibed above. Should the Miller-Abbott tube be successful in npressing the obstruction, preliminary antibiotic treatment eans of sulfasuxadine, penicillin or streptomycin administrashould always be a part of the pre-operative preparation during wenty-four hours immediately preceding the operation. Two s of sulfasuxadine every four hours through the tube may be uted, or penicillin and streptomycin in adequate doses may be nistered intra-muscularly, starting the injections just before and ing them up during and after the operation.

st-operative.—Blood transfusion; intravenous fluid administrawith glucose, vitamin B and vitamin C, and intravenous protein be indicated in badly neglected cases. In both the obstructive non-obstructive types of colon lesions, the first indication is

to supply the fluid and food required for this period. Three th sand cc. of fluid intake by intravenous administration will be quired. The solution should contain 5 per cent glucose. In dition, 1000 cc. of fluid should be made up in normal saline tients with a normal chloride balance. Patients operated upon chronic intestinal obstruction with depleted chloride may re 2000 or perhaps 3000 cc. of solution made up in normal sa When chloride deficiency is evident, chloride blood determinat will be of assistance in determining the exact amount of chloride t administered. Vitamin C and vitamin B complex are importan the early post-operative period in a patient in this category.

A general rule to follow would be to administer vitamin C 500 mg. daily dosage, together with 1 or 2 ampules of solubl complex for the first 4 to 5 days of the post-operative period. C tinued use of sulfasuxadine, penicillin and streptomycin will pend upon the operative procedure in connection with the possi soiling of the peritoneal cavity during the course of the operati In each case, the indications and proper dosage of antibiotic m be decided by the conditions attendant upon the operative findin and operative experience in each case.

Peritonitis

From whatever cause, peritonitis may and does interfere w the absorption of fluid, food and vitamins. The conditions un which peritonitis may occur have been pretty well covered in t text heretofore. In general, peritonitis interferes with the fo absorption, food intake and, the infecting organism will indic the use of antibiotics. The primary consideration is to ascertain t organisms present; whether or not there may be an associat intestinal obstruction, and to what extent the gastro-intesti functioned is maintained. In the most extreme instances, no a sorption of fluid or food by the gastro-intestinal tract may be pected. In both instances, from 4000 to 6000 cc. of fluid will ha to be administered by intravenous routine for a given twenty-fo hour period. The addition of 5 per cent glucose to the fluid, w from 9 to 18 grams of sodium chloride per day, 800 to 1000 mg. vitamin C, 1 to 2 ampules of soluble B complex will be indicat

The antibiotic measures are determined depending upon t invading organism. When there is present the streptococcus a bacillus coli, as is usually the case, penicillin in large doses will found to be sufficient. The additional use of streptomycin may instituted when bacillus coli predominate. Too much dependen should not be placed upon the streptomycin. Frequent use blood plasma and blood transfusion should be resorted to when t bacillus coli infection seems to be out of control.

In all cases of peritonitis the surgeon should be alert to the occ rence of intestinal obstruction. The proper administration of flu carbohydrate, soluble protein, vitamins, etc., may be carried from day to day. Suddenly the patient is seen to be losing grou

ccurs, abdominal distention is apparent, intestinal ob- suspected. In these cases of peritonitis with inflamma- inal obstruction, the better policy to pursue is usually medical treatment rather than early operative inter- The majority of intestinal obstructions of this type will er inflammatory exudate has subsided with relief of the obstruction. Opening the abdomen in an attempt to obstruction of this type is disappointing. The intestines to be found matted together and no definite area of intes- ruction can usually be determined. It is a much better wait for resolution of inflammatory exudate; in the mean- ing up the daily metabolism needs of the patient by intra- eans. In such instances the patient may be carried along to three weeks without suffering any undue consequences.

TETANY, INFANTILE.

VINCENT LARKIN M. D.

sion.—Tetany is a condition characterized by neuro-muscu- rexcitability which is dependent upon a disturbance of the metabolism. This hyperexcitability gives rise to tonic of the muscles of the extremities and larynx. This results in edal spasm, laryngismus stridulus and in severe cases, zed convulsions. It is an underlying etiology in infantile ions occurring after the age of five months.

plays the most important rôle in the etiology of tetany. occurs almost exclusively in artificially fed babies, although ometimes been observed in negro and premature babies that een entirely breast-fed. Its occurrence is just as frequent -nourished as in mal-nourished infants. When it occurs in l-nourished it is usually associated with rickets. We cannot te the disease directly to a vitamin D deficiency, but it is that the administration of this vitamin exerts a curative No other vitamin seems to be involved. Tetany is rarely infants receiving acid-milk mixtures, but is more apt to those who are taking large amounts of cow's milk together small amount of carbohydrates.

administration of parathyroid extract helps to relieve the ms of infantile tetany, and it has been suggested that this on is the result of parathyroid deficiency. While experi- removal of the parathyroid results in all the manifestations ny, nevertheless in infants who have died of this disease as been no constant change demonstrable in the parathy- nds.

r the most important factor in the pathogenesis of tetany is lute or relative decrease in the quantity of ionized blood . The normal calcium of 10 to 11 mg. per 100 cc. in latent falls to 7 or 8 mg., and in active tetany below 6 mg. This cium of the serum is certainly not related to a deficiency of

calcium in the diet, because the disease is most frequently infants fed on cow's milk which has a much higher calcium than human milk. The calcium must either be rapidly re from the blood or poorly absorbed. Cow's milk has a relatively proportion of phosphate and this interferes to a certain extent calcium absorption. The feeding of large amounts of cow's mixtures with the addition of relatively small amounts of fer able carbohydrate gives rise to an alkalinity in the intestinal which is considered unfavorable to calcium absorption. factors are further borne out by tetany developing durin stage of healing rickets, probably due to the fact that the circu calcium in the blood serum is removed and deposited in calcifying

The phosphate content of the blood in cases of infantile te is either normal or very slightly increased. This increase is sufficiently high to explain the low calcium content.

After the alkalinity of the serum is increased, even in the pre of normal calcium content, all of the symptoms of tetany may oc In infants who have developed an alkalosis as the result of vom or after prolonged administration of alkalis, tetany may deve The administration of acid-producing salts leads to a disappear of these symptoms without bringing about any marked chang the calcium content of the serum.

Diet.—The best means of preventing tetany are breast feed and exposure to sun and ultra-violet light. Vitamin D, in the f of cod-liver oil or viosterol, is also of great value as a prophyla measure. In artificially fed infants, the use of acid milk is pre able to sweet milks. The diet should not contain an exces amount of milk in proportion to other constituents; sugars or cer should be given in an amount approximating one-tenth of amount of milk given, vegetables and fruit juices should be exclu from the diet.

Calcium chloride and ammonium chloride are metabolized w the liberation of hydrochloric acid. Therefore these salts may used efficaciously. In older children who cannot tolerate the ta of ammonium chloride, it may be given in various vehicles.

THRUSH (SPRUE).

Vincent Larkin M. D.

Discussion.—Thrush is a mycosis of the mouth, characterized growth upon the mucous membrane—in discrete spots or la patches—of white fungus, variously known as monilia cand albicans and saccharomyces albicans, the latter proba he best designation. This fungus may be found in swee stances. It does not attach itself readily to intact muc e, nor does it gain foothold on a damaged membrane of fairly healthy child.

's common in infants with harelip and in those chil ity has been lowered by disease. Measles is a partic ause of its effect on the oral mucous membrane. M

f thrush occur during the first and second year. It thrives
itals and institutions because of the debilitated state of the
s and the ease with which rubber nipples, cloths, etc., can
e contaminated.

l applications and mouth washes used for stomatitis have no
upon thrush. Boric acid and potassium chlorate have been
ost effective medicaments. As thrush produces nutritional
which makes the fungus growth possible, the treatment re-
itself into rehabilitation of the patient through proper nutri-
Soft, high-caloric foods and concentrated dry milks should
en in small quantities at frequent intervals. Fish-liver oils
itamin concentrates, while not specifically indicated, will
r aid in rehabilitation. In severe cases, feeding is better
ated by the use of gavage as the rubber nipple of the bottle
considerable irritation and retards improvement.

TUBERCULOSIS.

cussion.—Diet plays an important rôle in both pulmonary and
pulmonary tuberculosis. Irrespective of the psychologic
rt of gained weight with its euphoric acceptance by both the
nt and the physician, a better understanding of the nutritional
nds of the tuberculous does not always sanction this physical

this writing, pulmonary tuberculosis is evaluated, not by the
t of the disease, but by the character of the infection. The
e exudative forms present a sudden and toxic beginning. When
is associated with pulmonary necrosis, caseation and liquefac-
promptly follow. The necrotic tissue is expectorated with
tant cavity formation. From the start of this type of tubercu-
, the victim is prone to be intensely toxic. With the expectora-
of necrotic lung tissue, the symptoms of toxemia begin to dis-
ar. Unfortunately, the resultant cavitation being an excellent
re medium for the tubercle bacilli, the bacteria multiply
lly. This commonly results in further pulmonary involvement
recurrent toxemia. Hence, the clinical picture of pulmonary
rculosis is a variegated one as can be readily seen, requiring
ent dietary changes.

e dietetic care of febrile conditions has been universally divided
two types, one for fevers of short duration, such as are encoun-
l in influenza, la grippe, tonsillitis, etc. In these conditions the
proves to be essentially one of starvation. Solid foods are
ibited and a high fluid intake with moderate carbohydrates,
ts and low-caloric value is instituted. This temporary starva-
unassociated with acidosis proves beneficial and is felt to hasten
alescence.

e second type of dietetic care of the pyretic is directed at
s of longer duration in which category tuberculosis probably
e most common.

ose interested in nutrition have definitely reached the conclu-

sion that poundage is not the *sine qua non* of health. The older school emphasized the continued gain of weight of the tuberculous patient. This they accomplished by what is now evident to be shot-gun overfeeding. Those whose work has been restricted to tuberculosis have seen the falsity of this trend of thought.

At the present writing, it has as yet been undetermined what specific rôle diet plays in establishing the resistance of the individual to tuberculosis. It is well recognized, however, that undernourishment predisposes to a questionable prognosis. Clinical experience has taught that a moderately high caloric diet, well-balanced in minerals and vitamins offers a patient a more favorable outlook.

It has been well established that the presence of fever increases the body metabolism to an extent which requires greater caloric intake to offset the burning of endogenous nutritive material. Hence, the total caloric intake demands an increase over the normal calculated maintenance level when fever is present. This is especially true in relation to the protein allotment. Since, however, respiratory activity should be kept at a minimum, the diet should offer sufficient protein, carbohydrate, and fat—but no more. With the patient in bed, 2500 Calories are adequate when furnished by 60 grams of protein, 225 grams of carbohydrate, and 150 grams of fat.

The proper approach to the dietetic care of the tuberculous patient is to establish a complete inventory of the physical being for whom a diet is to be prescribed. This comprises a complete chemical blood study with particular reference to blood calcium, urea nitrogen, non-protein nitrogen, sugar, uric acid, chlorides, phosphorus and hemoglobin. An estimation of the presenting weight in relation to the calculated weight establishes an objective which should not be lost sight of.

Additionally, in order to avoid unpalatability and food aversion, cognizance must be taken of the past dietary habits. Any existing intolerance or allergic reaction should be investigated.

Another factor so often overlooked is the lack of regard for the commonly associated *anorexia*. When the appetite is small, it is ridiculous to outline large volumetric meals. This obstacle can frequently be met most simply by omitting all non-caloric liquids.

It has generally been accepted that an abundance of *vitamins* is indicated. Although increased intake of calcium and a plentiful supply of vitamin D have been stressed as important in tuberculosis, there is evidence that this is not always the wisest course to pursue. Such a procedure may be followed in the acute stage but as convalescence progresses into remission, these two should be provided in normal amounts only. During the acute stage at least 10,000 units of vitamin A are desirable. The intake of ascorbic acid should approximate 100 mg. daily. It is worth noting that Osborn and Gear (1940) have observed that those animals which are incapable of synthesizing vitamin C are those which are susceptible to tuberculosis. This being the case, a high level of ascorbic acid intake should be maintained in those disposed toward this disease. Gener-

mounts of the vitamin-B complex are also recommended. ence should be made to the several vitamins for further nation.

-normal blood nitrogen readings are pathognomonic of insuffi- protein ingestion. Aside from the chemical blood findings the nce of fever always necessitates a higher protein intake than al. In the presence of *anemia*, either nutritional or due to rrhage, it is indicated to administer those foods most capable reasing hemoglobin. Refer to the anemias.

e question of *dehydration* which both medically and surgically een a *bête noir* to the profession, can be viewed with much less n when its chemistry is better understood. Bearing in mind this condition exists only in the absence of sufficient osmotic e tension, it is imperative that this be altered to restore the er tissue balance. In cases of inordinate tissue retention, *i. e.*, iac failure with edema, hepatic cirrhosis, Addison's disease, ous types of nephritis, etc., all are in accord as to salt restriction. ehydration the opposite program should be instituted and salt ld be liberally administered.

is only of recent years that the profession has come to recognize the offending radical in salt is not chlorine but sodium. An tration admirably bearing this out is ammonium chloride which ecognized as being an efficient diuretic, whereas sodium bicar- ate is excessive quantities will produce a generalized edema.

he following list presents those foods which analytically have n found to be *highest in sodium* although not necessarily as sodium ride:

read	Egg-white	Paprika
utter	Endive	Pepper, black
arrots	Lima beans (dry)	Raisins
aviar	Meat extract	Spinach
heese	Olives	Watercress
lams	Oysters	Wheat bran
rackers (Biscuits)		Wheat-germ

ll brined, corned, pickled, smoked and salted foods.

t must not be overlooked that whereas the average tuberculosis ient at the time of diagnosis is generally underweight, it cannot oncluded that this is the case in all patients presenting this dis- e. It is well recognized that pulmonary tuberculosis afflicts the rweight in a surprisingly large number. In these instances a h-caloric diet naturally is not to be observed. The caloric yield uld be reduced but the protein factor should be maintained at itable level.

n *résumé*, the regular diet for pulmonary tuberculosis should be derate in calories and protein during the acute stage and higher hese respects during convalescence. A liberal supply of all vita- s with particular emphasis on vitamins A, B, and C is recom-

mended. Additional augmentations or deprivations will de- upon the individual demands of the case at hand.

Reasonable care should be exercised in the use of the foll although their use in moderation is not actually prohibited: T and coffee, beer, ale, in tonic doses; pork products other than ba and smoked ham.

Advised.

- Eggs
- Meat and fish
- Milk and milk products
- Fruits, raw and cooked
- Vegetables, raw and cooked
- Whole grain cereals

Typical Menu.

Breakfast:
Fresh *or* stewed fruit
Whole grain cereal with cream and sugar
Egg
Whole grain toast or rolls with butter
Milk or cocoa

Midmorning:
Buttermilk, milk *or* eggnog

Luncheon:
Cream of vegetable soup
Choice: meat, fish, eggs *or* cheese
Cooked vegetable
Salad with dressing
Whole grain bread with butter
Fresh or stewed fruit
Milk

Midafternoon:
Fruit *or* vegetable juice

Dinner:
Meat *or* fish
Potato
Cooked vegetable
Salad with dressing
Whole grain bread with butter
Simple dessert
Milk

Bedtime:
Milk *or* cocoa

The patient should not be allowed to sleep late into the mornin The breakfast hour is 8 A.M. If breakfast is served at 10 A.M. an the extra feeding given an hour later there will be little room in th stomach for more food at noon! Breakfast should be served at 8 A.M dinner at 12.30 or 1 P.M. and supper at 6.30 P.M. The meals are t be supplemented by feedings at 10 A.M., 4 P.M. and 9 P.M. Warm milk at 9 P.M. may assist in promoting sleep. The addition of egg white at all times will prove efficient in increasing the daily prote intake.

dless to say the writer does not believe that dietary care of berculous is the *sine qua non* of recovery. In the presence of oot question of availability and assimilation of the nutritive ll as mineral content of foods, it would be foolhardy to rest diet alone for optimum response. The selection of proper te, bed rest, passive and active exercises, together with core as well as alleviative medications in conjunction with a r diet should produce a *tout ensemble* of restoration to health.

lmonary Hemorrhage.—All food and fluids should be stopped welve hours. During this period small pieces of ice may be to allay thirst. After the twelve-hour period a typhoid fever of diet should be instituted. This diet is soft, high in caloric , and high in fluids. When temperature and hemorrhage have d, return to the regular diet as indicated.

berculous Enteritis.—This is a common complication of pulary tuberculosis. Strangely, this is especially true in those with cavities. Some authorities believe that every cavity with positive sputum should be looked upon as a potential rculosis of the intestines. In such conditions a non-residue is advised. This necessarily limits the administration of leafy root vegetables and fruits which in turn almost eliminate the h needed vitamin B. Inasmuch as this deficiency affects chiefly gastro-intestinal tract and the nervous system, it is recommended a vitamin B concentrate be added to the diet. In a similar ner some workers believe that both vitamins C and D have lective favorable effect on intestinal tuberculosis. This view cates the addition of both cod liver oil and tomato juice.

t is not uncommon to encounter an associated disturbance of ium metabolism in tuberculous enteritis or colitis, which has n observed to result in tetany or tetanoid symptoms. This essitates specifically infiltrating into the diet those items high alcium which are not contraindicated due to their roughage tent. Foods most readily adaptable are milk in any form, iceam, cocoa and egg-yolk

ised.

ats.	*Fish.*	*Vegetables.*
eef	Bluefish	Hominy
amb	Cod	Potatoes
iver	Mackerel	Puréed peas or beans; skins removed
oultry	Oysters	Rice
	Salmon	Tomatoes stewed and strained
	Weakfish	Cauliflower tops

ry Products.	*Miscellaneous.*	
utter	Cream of wheat	Plain cakes
heese	Custards	Simple puddings
ream	Farina	Stewed fruits (without skins)
ggs	Fruit juices	Strained rolled oats
gg-white	Ice-cream	White bread
ilk	Jellies	

Omit.

Most green vegetables, salads, raw fruits, sugar in concentra form (as candies, etc.).

Typical Menu.

Breakfast:
Fruit juice
Cooked cereal with cream and sugar
Egg, except fried
Toast *or* rolls with butter
Milk *or* cocoa
Midmorning:
Buttermilk *or* milk
Luncheon:
Choice: meat, fish, eggs *or* cheese
Puréed vegetables
Bread with butter
Stewed fruit
Milk
Midafternoon:
Eggnog, custard, junket *or* ice-cream
Dinner:
Cream of vegetable soup
Meat *or* fish
Potato, baked or mashed
Puréed vegetables
Bread with butter
Simple dessert
Milk *or* coffee
Bedtime:
Milk *or* cocoa

Suggestions.—Refer to Mucous Colitis, Amebic Dysentery, Ulcerative Colitis, Bland Foods and Foods Lowest in Cellulose for further dietetic suggestions.

Tuberculosis of the Larynx.

Laryngeal tuberculosis without dysphagia necessitates the regular diet for tuberculosis as hereafter outlined.

In tuberculosis of the larynx with dysphagia, it is necessary to plan menus which are not bulky and are bland, so that increased salivation and pain can be somewhat controlled. In severe cases the nutrition is maintained with considerable difficulty. The type of diet for this condition varies directly with the degree of dysphagia present. In brief, the diet resolves itself into one which is either fluid or semi-fluid in character. A practical rule to follow is that all foods which "pour" should be administered.

Tuberculosis of the Skin.

Refer to Dermatology for a complete description of the Gerson

he Gerson-Sauerbruch-Herrmansdorfer diet which is believed of great value in treating tuberculosis of the skin.

TYPHOID FEVER.

scussion.—The dietetic management of the typhoid patient has rgone a marked metamorphosis during the past thirty years to this period, the accepted diet was one of restriction. This iction was observed in reference to both dietary volume and ic value. The older school accomplished this by the utilization milk diet, augmented by broths. Bearing in mind the comly associated anorexia together with the various idiosyncrasies foibles of the patients, this older diet practically amounted to arvation. Invariably, after a successful termination of the ise, a very lengthy convalescence was faced. Not only did the ent have to recuperate from the pyrexia and toxemia, but also a three-week or longer starvation with resultant anemia, pro-destruction and deprivation.

he present dietetic attitude reverses the strictly adhered-to tenets he older regimen. Today the customary diet is arranged to give 50-pound patient between 3000 and 4000 Calories *per diem.* experience of the medical profession in instituting this higher n of caloric diet in contradistinction to one of 1000 Calories or has been exceedingly gratifying.

Coleman (1907), who was instrumental in bringing about this nge from low- to high-caloric feeding, after extensive observans made on two groups of typhoid patients of 22 cases per group, group representing a high- and the other a low-caloric feeding, ched the following conclusions:

he total duration of the disease was unaltered in each group.
he time of convalescence was materially decreased in those on h-caloric feeding.
)ral conditions of patients on high-caloric feeding were better.
Vausea and vomiting were slightly less on high-caloric diets.
Iigh-caloric diets increased the incidence of tympanites approxitely 100 per cent.
)iarrhea occurred with about one-third the frequency in those es maintained by the higher diet.
Associated nervous symptoms likewise were observable in about -third the percentage of those on low-caloric diet.
Perforation in high-caloric diet was less than 1 per cent, whereas -caloric feeding yielded over 3 per cent.
Relapses were observed in 8 per cent of patients on high-caloric ling. The low-caloric incidence was almost 15 per cent.
Iortality in high-caloric cases was 8.1 per cent as against 17.6 cent in those patients on low-caloric feeding.

Vhen treating typhoid the practitioner is dealing with a severe eral metabolic disturbance. The basal metabolic rate of the ly is increased. This appears to be in direct proportion to the

amount of temperature generated. The protein destruction excessive. The amount of destruction has been held to be three-fold more than that observed in normal health. The metabolism of carbohydrates, the great human fuel, remains as observed in health. The tendency toward the development of anemia is very severe, due to the excessive protein destruction together with the decreased protein intake and the associated mal-assimilation of protein.

A presentation of the diets as used by Coleman, with slight modification, permits little betterment in the dietetic care of the present-day typhoid patient.

Owing to the decrease in incidence of typhoid fever during the past twenty years, the establishment of any new diet would be pretentious and unwarranted. The incidence of typhoid fever, not only in practice but even in the large civil hospitals, has become relatively negligible.

The aim in feeding the typhoid patient is manifold: The maintenance of body weight to prevent wasting; the provision of readily assimilable items of diet; the furnishing of sufficient protein to replace the severe drain on the already overtaxed body protein; sufficient carbohydrates to save further destruction of body protein and fat; and the insurance of adequate liquid intake. The practitioner can reasonably anticipate that a high-caloric diet not only will offset any loss in weight at the termination of the disease, but frequently a gain over the initiatory weight. Naturally this discounts the incidence of complication such as hemorrhage or perforation.

Clinically, the problem presented is the combating of pyrexia, toxemia and localized ulcerations.

Several specifications in dietetic management are to be observed: Avoidance of overloading the stomach at any one time; omission of those foods which tend to abdominal distention; deletion of foods producing an undue constipation; omission from the diet of those items which, in specific cases, are not tolerated.

The mentioned conditions can be best met with a diet high in caloric value (2000 to 3000 Calories), predominating in liquid, and moderately low in fat (owing to the generally associated acidosis). Frequently administered feedings of relatively small volume are recommended to avoid overdistention.

Diets of Various Caloric Values Used by Coleman.

The author has not corrected the caloric values of the various food items presented in the Coleman diet.

For all practical purposes the necessity for greater caloric specificity does not obtain.

1000-Calorie Day.

Milk, 1 quart (1000 cc.)
Cream, $\frac{1}{3}$ ounce (10 cc.)
Lactose, $1\frac{2}{3}$ ounces (50 grams)

1500-Calorie Day.

Milk, $1\frac{1}{2}$ quarts (1500 cc.)
Cream, $1\frac{2}{3}$ ounces (50 cc.)
Lactose, $3\frac{1}{3}$ ounces (100 grams)

ings, each to contain:
, 4 ounces
m, 2 drams
ose, 6 grams

alorie Day.
, $1\frac{1}{2}$ quarts (1500 cc.)
am, 8 ounces (240 cc.)
ose, 4 ounces (125 grams)

lings, each to contain:
k, 7 ounces
am, 1 ounce
tose, 18 grams

alorie Day.
k, $1\frac{1}{2}$ quarts (1500 cc.)
am, 8 ounces (240 cc.)
tose, 8 ounces (250 grams)

lings, each to contain:
lk, 7 ounces
eam, 1 ounce
ctose, 36 grams

8 Feedings, each to contain:
Milk, 6 ounces
Cream, 2 drams
Lactose, 16 grams

3000-Calorie Day.
Milk, $1\frac{1}{2}$ quarts (1500 cc.)
Cream, 1 pint (480 cc.)
Lactose, 8 ounces (250 grams)

8 Feedings, each to contain:
Milk, 6 ounces
Cream, 2 ounces
Lactose, 1 ounce (30 grams)

3900-Calorie Day.
Milk, $1\frac{1}{2}$ quarts (1500 cc.)
Cream, 1 pint (480 cc.)
Lactose, 16 ounces (480 grams)

8 Feedings, each to contain:
Milk, 6 ounces
Cream, 2 ounces
Lactose, 2 ounces

Following Diet Furnishes Approximately 4000 Calories:

	Hours.	*Total.*	*Calories.*
ilk, 6 ounces	9 A.M.—1, 3, 7 P.M.	1260 cc.	About
eam, 2 ounces	10 P.M.—1, 4 A.M.	420 cc.	2000
ctose, 10 grams	Distributed	70 gm.	Calories

00 A.M.	*Calories.*
Egg, 1	80
Toast, 1 slice	80
Butter, 20 grams	150
Coffee, cream, 2 ounces	120
Lactose, 20 grams	80
	Total 510

) A.M.	*Calories.*
Egg, 1	80
Mashed potato, 20 grams	20
Custard, 4 ounces	250
Toast (or bread), 1 slice	80
Butter, 20 grams	150
Coffee, cream, 2 ounces	120
Lactose, 20 grams	80
	Total 780

5.00 P.M.	Calori
Egg, 1	80
Cereal, 3 tablespoonfuls	150
Cream, 2 ounces	120
Apple sauce, 1 ounce	30
Tea, cream, 3 ounces	180
Lactose, 20 grams	80
	Total 640

Lactose-sweetened lemonade may be substituted for the m mixture at 3 P.M.

The Following Diet Furnishes Approximately 5500 Calories:

	Hours.	*Total.*	*Calor*
Milk, 5 ounces	9, 11 A.M.—1, 3, 7 P.M.	1200 cc.	Abou
Cream, 2 ounces	10 P.M.—1, 4 A.M.	480 cc.	280
Lactose, 15 grams	Distributed	120 gm.	Calor

7.00 A.M.	*Calories.*
Egg, 1	80
Toast, 2 slices	160
Butter, 20 grams	150
Coffee, cream, 3 ounces	180
Lactose, 20 grams	80
	Total 650

11.00 A.M.	*Calories*
Eggs, 2	160
Toast, 2 slices	160
Butter, 20 grams	150
Mashed potato, 70 grams	70
Custard, 8 ounces	500
	Total 1040

5.00 P.M.	*Calories.*
Egg, 1	80
Toast, 2 slices	160
Butter, 20 grams	150
Cereal, 6 tablespoonfuls	290
Cream, 4 ounces	240
Apple sauce, 1 ounce	30
Tea, cream, 2 ounces	120
Lactose, 20 grams	80
	Total 1150

owing Diet Furnishes Approximately 5500 Calories:

menu, although calorically equivalent to the preceding, is
l for the later stages of convalescence.

	Hours.	Total.	Calories.
. 5 ounces	9, 11 A.M.—1, 7 P.M.	1050 cc.	About 2300 Calories
n, 3 ounces	10 P.M.—1, 4 A.M.	630 cc.	
se, 15 grams	Distributed	105 gm.	

.M.	Calories.
g, 1	80
real, 5 tablespoonfuls	250
eam, 2 ounces	120
ast, 2 slices	160
tter, 20 grams	150
ffee, cream, 2 ounces	120
ctose, 20 grams	80
	Total 960

A.M.	Calories.
ggs, 2	160
ashed potato, 80 grams	80
ustard, 8 ounces	500
reamed chicken, 1 ounce	50
oast, 2 slices	160
utter, 20 grams	150
	Total 1100

P.M.	Calories.
emonade (lactose, 120 grams)	480

P.M.	Calories.
ereal, 2 tablespoonfuls	290
ream, 2 ounces	120
oast, 2 slices	160
actose, 20 grams	80
	Total 650

gestions.—The appearance of intestinal hemorrhage or per-
n demands complete cessation of solid and liquid ingestion.
mmediate procedure to be instituted in these cases is the
as for gastric hemorrhage. Surgical aid is specifically indi-
in perforation.

ome cases it is found that while cow's milk disagrees, the
n of cow's milk with alkaline waters or Vichy may be toler-
In the event of continued cow's milk intolerance, the insti-
of peptonized or some like milk modification is indicated.
event that cow's milk, in liquid form, no matter how altered,

is still intolerable, the prescription of any of the well-kn
milk formulæ may be attempted. In the event of still furt
or milk modification difficulty, the administration of al
may be tried.

If bowel looseness intervenes, peptonized milk, barley, arro
or rice gruels may be infiltrated into the diet.

In the presence of continued gastric distress, bloating, na
heartburn, belching, etc., a study of the gastric acid content m
indicated. Following this determination, alteration in the
associated with acid or alkali therapy will often prove bene
The administration of bismuth or like medications should be
fully watched. Flatulence can frequently be controlled by
stituting cane sugar for milk sugar, the omission of potato, if
scribed, and the giving of liquids between feedings rather tha
feeding times. Frequently, specific foods such as cocoa, too h
sweetened fruit juices, malted milk, etc., have been proved cap
of producing flatulence.

The clinician should bear in mind that protein is derived es
tially from egg-white, fish, meat and milk curd. This is particul
important when a diet for convalescence is to be instituted.

The dietetic changes indicated in diarrhea are dependent, a
children, on the physical characteristics of the excreta. Bri
the contents, when offensive, are either fermentative or acrid.
former generally indicates too high a carbohydrate intake and
latter a fat imbalance. An analysis of the stool will often indi
the dietary change.

As in treating all disease, it must be borne in mind that we
dealing with an acutely ill individual in whom the appetite
only is generally diminished but capable of great caprice. He
it is wise wherever feasible to consult the patient's palate be
instituting any diet. It is needless, and frequently detrimen
when a patient has had a long-standing abhorrence of certain fo
to insist on the taking of these foods when substitution can rea
be accomplished.

The proper care of the mouth and nose frequently aids in ma
taining an appetite. This care in general also effects a better me
condition in relation to food.

Often it is necessary to continue the frequent feeding thro
out the twenty-four-hour period. This is particularly essen
when the patient has rebelled at a number of feedings offe
during the day, or in those cases in which the quantity take
sufficiently below that required to produce a good caloric yield.

For the dietetic care of the irrational patient refer to Supplem
tary Methods of Feeding. Refer also to Fluid Foods and Soft Fo

ULCER, GASTRIC AND DUODENAL.

Clarence Fuller, M.D.

Discussion.—In the management of gastric and duodenal u
the physician is called upon to outline a specific dietetic sche
in which the individual food items and the quantities for each n

iely stated, leaving the patient no alternative in respect
t.

distinction between duodenal and gastric ulcer is made
g their dietetic treatment. They are considered biologically
, both having the same pathogenesis, progress and response
nent. At times, they diverge so slightly clinically, that
ation is exceedingly difficult.

nly clinical variation that seems to be outstanding is that
plained-of pain in duodenal ulcer is alleviated by food,
in gastric ulcer it is aggravated thereby. The excess
hydrochloric acid is more commonly associated with duo-
an with gastric ulcer.

se conditions, gastric and duodenal ulcer, a careful gastro-
l history is probably more essential than in any other
of this tract. More cases are mis-diagnosed ulcer of the
than any other symptom-complex with which we come in
This is probably due to past teachings, in which pain
ting, alleviated by food, associated with heartburn, water-
etc., was taught to mean ulcer. This syndrome, we have
is that of gastric hyperacidity of which, truly, ulcer is a
oducing factor. However, gastric hyperacidity, *per se*, is
essarily pathogenic of ulcer but most frequently represents
xtra-gastric etiology. Illustrations of this are commonly
d in gall-bladder disease, chronic appendicitis, pyelitis, peri-
ic abscess, renal calculi, ovarian tumors, uterine fibroids,
mucous colitis, etc.

ate, a definite etiology for duodenal or gastric ulcer has not
atisfactorily demonstrated. It has been definitely proved
astric hyperacidity alone does not produce ulcer, but is an
panying finding.

kly, the economic treatment of ulcer rests with surgery.
er, in viewing surgical results, the economy thereby obtained,
minority of cases, is often definitely dissipated in subsequent
l care.

types of treatment for gastric or duodenal ulcer divide
lves into two types: stationary and ambulatory.

object in treatment is motor and secretory rest of the stomach.
all, psychic stimulation of gastric activity is unpardonable.
r contractions are to be avoided. Both at bedtime and, if
e, at 2 or 3 A.M. the patient should be given bread and butter
k and cream. Emotional calm is to be sought. Naturally,
ion to bed will insure more gastric rest. This is advisable
first part, if not the whole course, of the treatment. Exer-
r the bedridden (stationary) patient is omitted. Whatever
muscle tone develops may be restored readily at a later period.
ulatory therapy, although far from ideal, is one that is
e of good results if properly supervised. Even in ambulant
ement, exercise should be kept to a minimum wherever pos-
being restricted to household and business duties.

medical care of ulcer is not purely a dietary one. The judicious

use of properly selected medications is as essential as the con-scientious adherence to a correctly prescribed diet.

The general feeling in the present state of scientific advance, both surgical and medical, is that one or two courses of medical therapy should be attempted prior to operative interference. It should be stressed that mucous membranes do not heal under starvation. Adequate nutrition, especially as regards certain vitamin factors, must be established.

It seems wise to present, for the benefit of the practitioner, several series of diets adopted from standard sources. Various names, such as Lenhartz, Sippy, Einhorn, Meulengracht, Andresen and others, stand forth as representing years of painstaking experimentation associated with large clinical experience, in the care of ulcer. Each of the following diets has strong advocates and critics. The result is that decision as to proper diet can best be left with the individual practitioner.

Lenhartz Diet.—The total duration of the Lenhartz diet is fourteen days, during which time hourly feedings are administered either from 7 A.M. to 7 P.M. or 8 A.M. to 8 P.M. Customarily, a complete twelve-hour rest period during the course of the night is observed. This diet is definitely not an ambulatory one.

The principle of the Lenhartz diet is the institution of a high caloric diet, increasing very rapidly from 280 Calories per day to 3073 Calories, arrived at on the fourteenth day. This diet produces a partial gastric rest for the first week. Following this period the diet approaches a normal one with the exception that it is predominantly bland.

The eggs utilized in each day's feeding are beaten up raw and equally divided into the number of feedings indicated. All feedings are spoon-fed. The following details clearly indicate the method of institution:

First Day:

7.00 A.M.	Egg
8.00 A.M.	Milk, 20 cc. (⅔ ounce)
9.00 A.M.	Egg
10.00 A.M.	Milk, 20 cc. (⅔ ounce)
11.00 A.M.	Egg
NOON.	Milk, 15 cc. (½ ounce)
1.00 P.M.	Egg
2.00 P.M.	Milk, 15 cc. (½ ounce)
3.00 P.M.	Egg
4.00 P.M.	Milk, 15 cc. (½ ounce)
5.00 P.M.	Egg
6.00 P.M.	Milk, 15 cc. (½ ounce)
7.00 P.M.	Egg

Total: eggs (raw), 2; milk, 100 cc. (3⅓ ounces); Calories, 280

Day:

A.M.	Egg
A.M.	Milk, 30 cc. (1 ounce)
A.M.	Egg
A.M.	Milk, 30 cc. (1 ounce)
A.M.	Egg
N.	Milk, 30 cc. (1 ounce)
P.M.	Egg
P.M.	Milk, 30 cc. (1 ounce)
P.M.	Egg
P.M.	Milk, 30 cc. (1 ounce)
P.M.	Egg
0 P.M.	Milk, 30 cc. (1 ounce)
0 P.M.	Egg

ggs (raw), 3; milk, 200 cc. ($6\frac{2}{3}$ ounces); Calories, 470.

Day:

00 A.M.	Egg; sugar, 2 grams ($\frac{1}{2}$ dram)
00 A.M.	Milk, 50 cc. ($1\frac{2}{3}$ ounces)
00 A.M.	Egg; sugar, 3 grams ($\frac{3}{4}$ dram)
00 A.M.	Milk, 50 cc. ($1\frac{2}{3}$ ounces)
00 A.M.	Egg; sugar, 3 grams ($\frac{3}{4}$ dram)
ON.	Milk, 50 cc. ($1\frac{2}{3}$ ounces)
00 P.M.	Egg; sugar, 3 grams ($\frac{3}{4}$ dram)
00 P.M.	Milk, 50 cc. ($1\frac{2}{3}$ ounces)
00 P.M.	Egg; sugar, 3 grams ($\frac{3}{4}$ dram)
00 P.M.	Milk, 50 cc. ($1\frac{2}{3}$ ounces)
00 P.M.	Egg; sugar, 3 grams ($\frac{3}{4}$ dram)
00 P.M.	Milk, 50 cc. ($1\frac{2}{3}$ ounces)
00 P.M.	Egg; sugar, 3 grams ($\frac{3}{4}$ dram)

eggs (raw), 4; milk, 300 cc. (10 ounces); sugar, 20 grams rams); Calories, 637.

Day:

00 A.M.	Egg; sugar, 2 grams ($\frac{1}{2}$ dram)
00 A.M.	Milk, 70 cc. ($2\frac{1}{3}$ ounces)
00 A.M.	Egg; sugar, 3 grams ($\frac{3}{4}$ dram)
00 A.M.	Milk, 70 cc. ($2\frac{1}{3}$ ounces)
00 A.M.	Egg; sugar, 3 grams ($\frac{3}{4}$ dram)
ON.	Milk, 65 cc. (2 ounces)
00 P.M.	Egg; sugar, 3 grams ($\frac{3}{4}$ dram)
00 P.M.	Milk, 65 cc. (2 ounces)
00 P.M.	Egg; sugar, 3 grams ($\frac{3}{4}$ dram)
00 P.M.	Milk, 65 cc. (2 ounces)
00 P.M.	Egg; sugar, 3 grams ($\frac{3}{4}$ dram)
00 P.M.	Milk, 65 cc. (2 ounces)
00 P.M.	Egg; sugar, 3 grams ($\frac{3}{4}$ dram)

eggs (raw), 5; milk, 400 cc. ($13\frac{1}{3}$ ounces); sugar, 20 grams rams); Calories, 777.

Fifth Day:

7.00 A.M.	Egg; sugar, 4 grams (1 dram)
8.00 A.M.	Milk, 80 cc. ($2\frac{2}{3}$ ounces)
9.00 A.M.	Egg; sugar, 4 grams (1 dram)
10.00 A.M.	Milk, 80 cc. ($2\frac{2}{3}$ ounces)
11.00 A.M.	Egg; sugar, 4 grams (1 dram)
NOON.	Milk, 80 cc. ($2\frac{2}{3}$ ounces)
1.00 P.M.	Egg; sugar, $4\frac{1}{2}$ grams (1 dram)
2.00 P.M.	Milk, 80 cc. ($2\frac{2}{3}$ ounces)
3.00 P.M.	Egg; sugar, $4\frac{1}{2}$ grams (1 dram)
4.00 P.M.	Milk, 80 cc. ($2\frac{2}{3}$ ounces)
5.00 P.M.	Egg; sugar, $4\frac{1}{2}$ grams (1 dram)
6.00 P.M.	Milk, 90 cc. (3 ounces)
7.00 P.M.	Egg; sugar, $4\frac{1}{2}$ grams (1 dram)

Total: eggs (raw), 6; milk, 500 cc. ($16\frac{2}{3}$ ounces); sugar, 30 gra (1 ounce); Calories, 966.

Sixth Day:

7.00 A.M.	Egg; sugar, 4 grams (1 dram)
8.00 A.M.	Milk, 100 cc. ($3\frac{1}{3}$ ounces)
9.00 A.M.	Egg; sugar, $4\frac{1}{2}$ grams (1 dram); scraped beef, grams (3 drams)
10.00 A.M.	Milk, 100 cc. ($3\frac{1}{3}$ ounces)
11.00 A.M.	Egg; sugar, $4\frac{1}{2}$ grams (1 dram)
NOON.	Milk, 100 cc. ($3\frac{1}{3}$ ounces)
1.00 P.M.	Egg; sugar, $4\frac{1}{2}$ grams (1 dram); scraped beef, grams (3 drams)
2.00 P.M.	Milk, 100 cc. ($3\frac{1}{3}$ ounces)
3.00 P.M.	Egg; sugar, $4\frac{1}{2}$ grams (1 dram)
4.00 P.M.	Milk, 100 cc. ($3\frac{1}{3}$ ounces)
5.00 P.M.	Egg; sugar, 4 grams (1 dram); scraped beef, grams (3 drams)
6.00 P.M.	Milk, 100 cc. ($3\frac{1}{3}$ ounces)
7.00 P.M.	Egg; sugar, $4\frac{1}{2}$ grams (1 dram)

Total: eggs (raw), 7; milk, 600 cc. (20 ounces); sugar, 30 gra (1 ounce); scraped beef, 36 grams (9 drams); Calories, 1135.

Seventh Day:

7.00 A.M.	1 soft-boiled egg
8.00 A.M.	Milk, 100 cc. ($3\frac{1}{3}$ ounces)
9.00 A.M.	Egg; sugar, 13 grams (3 drams)
10.00 A.M.	Milk, 100 cc. ($3\frac{1}{3}$ ounces); scraped beef, 23 gra (6 drams); boiled rice, 33 grams (1 ounce)
11.00 A.M.	1 soft-boiled egg
NOON.	Milk, 125 cc. (4 ounces)
1.00 P.M.	Egg; sugar, 13 grams (3 drams)
2.00 P.M.	Milk, 125 cc. (4 ounces); scraped beef, 23 grams drams); boiled rice, 33 grams (1 ounce)
3.00 P.M.	1 soft-boiled egg

th Day—Continued:

.00 P.M.	Milk, 125 cc. (4 ounces)
.00 P.M.	Egg; sugar, 14 grams ($3\frac{1}{3}$ drams)
.00 P.M.	Milk, 125 cc. (4 ounces); scraped beef, 24 grams (6 drams); boiled rice, 34 grams (1 ounce)
.00 P.M.	1 soft-boiled egg

: eggs (raw), 4, and soft-boiled, 4; milk, 700 cc. ($23\frac{1}{3}$ ounces); ar, 40 grams ($1\frac{1}{3}$ ounces); scraped beef, 70 grams ($2\frac{1}{3}$ ounces); led rice, 100 grams ($3\frac{1}{3}$ ounces), with beef juice; Calories, 1580.

e diet changes on the eighth day, requiring only 4 raw eggs, may be divided into three feedings. The other 4 eggs are soft-boiled and given as directed by the diet.

th Day:

7.00 A.M.	1 soft-boiled egg
8.00 A.M.	Milk, 135 cc. ($4\frac{1}{2}$ ounces)
9.00 A.M.	Egg; sugar, 13 grams (3 drams)
0.00 A.M.	Milk, 133 cc. ($4\frac{1}{2}$ ounces); scraped beef, 23 grams (6 drams); boiled rice, 33 grams (1 ounce)
1.00 A.M.	1 soft-boiled egg; zwieback, 10 grams ($2\frac{1}{2}$ drams)
Noon.	Milk, 133 cc. ($4\frac{1}{2}$ ounces)
1.00 P.M.	Egg; sugar, 13 grams (3 drams)
2.00 P.M.	Milk, 133 cc. ($4\frac{1}{2}$ ounces); scraped beef, 23 grams (6 drams); boiled rice, 33 grams (1 ounce)
3.00 P.M.	1 soft-boiled egg
4.00 P.M.	Milk, 133 cc. ($4\frac{1}{2}$ ounces)
5.00 P.M.	Egg; sugar, 14 grams ($3\frac{1}{2}$ drams); zwieback, 10 grams ($2\frac{1}{2}$ drams)
6.00 P.M.	Milk, 133 cc. ($4\frac{1}{2}$ ounces); scraped beef, 24 grams (6 drams); boiled rice, 34 grams (1 ounce)
7.00 P.M.	1 soft-boiled egg

l: eggs (raw), 4, and soft-boiled, 4; milk, 800 cc. ($26\frac{2}{3}$ ounces); scraped beef, 70 grams ($2\frac{1}{3}$ ounces); boiled rice, 100 grams ($3\frac{1}{3}$ ounces); zwieback, 20 grams (5 drams); sugar, 40 grams ($1\frac{1}{3}$ ounces); Calories, 1720.

th Day:

7.00 A.M.	1 soft-boiled egg
8.00 A.M.	Milk, 150 cc. (5 ounces)
9.00 A.M.	Egg; sugar, 13 grams (3 drams)
10.00 A.M.	Milk, 150 cc. (5 ounces); scraped beef, 23 grams (6 drams); boiled rice, 66 grams (2 ounces)
11.00 A.M.	1 soft-boiled egg; zwieback, 20 grams (5 drams)
Noon.	Milk, 150 cc. (5 ounces)
1.00 P.M.	Egg; sugar, 13 grams (3 drams)
2.00 P.M.	Milk, 150 cc. (5 ounces); scraped beef, 23 grams (6 drams); boiled rice, 67 grams (2 ounces)
3.00 P.M.	1 soft-boiled egg; zwieback, 20 grams (5 drams)

Ninth Day—Continued:

4.00 P.M.	Milk, 150 cc. (5 ounces)
5.00 P.M.	Egg; sugar, 14 grams ($3\frac{1}{2}$ drams)
6.00 P.M.	Milk, 150 cc. (5 ounces); scraped beef, 24 gram drams); boiled rice, 67 grams (2 ounces)
7.00 P.M.	1 soft-boiled egg

Total: eggs (raw), 4, and cooked, 4; milk, 900 cc. (30 ounce sugar, 40 grams ($1\frac{1}{3}$ ounces); scraped beef, 70 grams ($2\frac{1}{3}$ ounce rice, 200 grams ($6\frac{2}{3}$ ounces); zwieback, 40 grams ($1\frac{1}{3}$ ounce or toast, 20 grams (5 drams); Calories, 2138.

Tenth Day:

7.00 A.M.	1 soft-boiled egg
8.00 A.M.	Milk, 166 cc. ($5\frac{1}{2}$ ounces)
9.00 A.M.	Egg; sugar, 13 grams (3 drams)
10.00 A.M.	Milk, 168 cc. ($5\frac{1}{2}$ ounces); scraped beef, 23 gram (6 drams); boiled rice, 66 grams (2 ounces)
11.00 A.M.	1 soft-boiled egg; zwieback, 20 grams (5 drams butter, 4 grams (1 dram)
NOON.	Cooked chopped chicken, 25 grams (6 drams); mil 166 cc. ($5\frac{1}{2}$ ounces)
1.00 P.M.	Egg; sugar, 13 grams (3 drams)
2.00 P.M.	Milk, 166 cc. ($5\frac{1}{2}$ ounces); scraped beef, 23 gram (6 drams); boiled rice, 66 grams (2 ounces); butte 4 grams (1 dram)
3.00 P.M.	1 soft-boiled egg; zwieback, 20 grams (5 drams); but ter, 4 grams (1 dram)
4.00 P.M.	Cooked chopped chicken, 25 grams (5 drams)
5.00 P.M.	Egg; sugar, 14 grams ($3\frac{1}{2}$ drams)
6.00 P.M.	Milk, 166 cc. ($5\frac{1}{2}$ ounces); scraped beef, 24 gram (6 drams); boiled rice, 67 grams (2 ounces); but ter, 4 grams (1 dram)
7.00 P.M.	1 soft-boiled egg

Total: eggs (raw), 4, and cooked, 4; milk, 1000 cc. ($33\frac{1}{3}$ ounces sugar, 40 grams ($1\frac{1}{3}$ ounces); scraped beef, 70 grams ($2\frac{1}{3}$ ounces boiled rice, 200 grams ($6\frac{2}{3}$ ounces); zwieback, 40 grams (1 ounces), or toast, 20 grams (5 drams); chicken, 50 gram ($1\frac{2}{3}$ ounces); butter, 20 grams (5 drams); Calories, 2478.

Eleventh Day:

7.00 A.M.	1 soft-boiled egg; milk, 250 cc. ($8\frac{1}{3}$ ounces); zwiebac 10 grams ($2\frac{1}{2}$ drams); butter, 4 grams (1 dram)
8.00 A.M.	Egg; sugar, 13 grams (3 drams); scraped beef, 2 grams (5 drams); boiled rice, 75 grams ($2\frac{1}{2}$ ounces zwieback, 10 grams ($2\frac{1}{2}$ drams); butter, 6 gram ($1\frac{1}{2}$ drams)
11.00 A.M.	1 soft-boiled egg; milk, 250 cc. ($8\frac{1}{3}$ ounces); butte 6 grams ($1\frac{1}{2}$ drams); zwieback, 10 grams ($2\frac{1}{2}$ drams

th Day—Continued:

.00 P.M. Egg; sugar, 13 grams (3 drams); cooked chopped chicken, 25 grams (6 drams); boiled rice, 75 grams ($2\frac{1}{2}$ ounces)

.00 P.M. 1 soft-boiled egg; milk, 250 cc. ($8\frac{1}{3}$ ounces); scraped beef, 20 grams (5 drams); boiled rice, 75 grams ($2\frac{1}{2}$ ounces); zwieback, 10 grams ($2\frac{1}{2}$ drams); butter, 6 grams ($1\frac{1}{2}$ drams)

.00 P.M. Egg; sugar, 14 grams ($3\frac{1}{2}$ drams); cooked chopped chicken, 25 grams (6 drams); boiled rice, 75 grams ($2\frac{1}{2}$ ounces); butter, 6 grams ($1\frac{1}{2}$ drams)

.00 P.M. 1 soft-boiled egg; milk, 250 cc. ($8\frac{1}{3}$ ounces); zweiback 10 grams ($2\frac{1}{2}$ drams); butter, 6 grams ($1\frac{1}{2}$ drams); scraped beef, 30 grams (1 ounce)

al: eggs (raw), 4, and cooked, 4; milk, 1000 cc. ($33\frac{1}{3}$ ounces); utter, 40 grams ($1\frac{1}{3}$ ounces); sugar, 40 grams ($1\frac{1}{3}$ ounces); craped beef, 70 grams ($2\frac{1}{3}$ ounces); boiled rice, 300 grams (10 unces); zwieback, 60 grams (2 ounces); chicken, 50 grams $1\frac{2}{3}$ ounces); Calories, 2941.

fth Day:

7.00 A.M. 1 soft-boiled egg; milk, 250 cc. ($8\frac{1}{3}$ ounces); zwieback, 10 grams ($2\frac{1}{2}$ drams); butter, 4 grams (1 dram)

9.00 A.M. Egg; sugar, 13 grams (3 drams); scraped beef, 35 grams (1 ounce); boiled rice, 75 grams ($2\frac{1}{2}$ ounces); zwieback, 10 grams ($2\frac{1}{2}$ drams); butter, 6 grams ($1\frac{1}{2}$ drams)

1.00 A.M. 1 soft-boiled egg; milk, 250 cc. ($8\frac{1}{3}$ ounces); zwieback 20 grams (5 drams); butter, 6 grams ($1\frac{1}{2}$ drams)

1.00 P.M. Egg; sugar, 13 grams (3 drams); cooked chopped chicken, 25 grams (6 drams); boiled rice, 75 grams ($2\frac{1}{2}$ ounces); zwieback, 10 grams ($2\frac{1}{2}$ drams); butter, 6 grams ($1\frac{1}{2}$ drams)

3.00 P.M. 1 soft-boiled egg; milk, 250 cc. ($8\frac{1}{3}$ ounces); scraped beef, 35 grams (1 ounce); boiled rice, 50 grams ($1\frac{2}{3}$ ounces); zwieback, 10 grams ($2\frac{1}{2}$ drams); butter, 6 grams ($1\frac{1}{2}$ drams)

5.00 P.M. Egg; sugar, 14 grams ($3\frac{1}{2}$ drams); cooked chopped chicken, 25 grams (6 drams); boiled rice, 75 grams ($2\frac{1}{2}$ ounces); zwieback, 10 grams ($2\frac{1}{2}$ drams); butter, 6 grams ($1\frac{1}{2}$ drams)

7.00 P.M. 1 soft-boiled egg; milk, 250 cc. ($8\frac{1}{3}$ ounces); zwieback 10 grams ($2\frac{1}{2}$ drams); butter, 6 grams ($1\frac{1}{2}$ drams)

tal: eggs (raw), 4, and cooked, 4; milk, 1000 cc. ($33\frac{1}{3}$ ounces); sugar, 40 grams ($1\frac{1}{3}$ ounces); scraped beef, 70 grams ($2\frac{1}{3}$ ounces); boiled rice, 300 grams (10 ounces); zwieback, 80 grams ($2\frac{2}{3}$ ounces); chicken, 50 grams ($1\frac{2}{3}$ ounces); butter, 40 grams ($1\frac{1}{3}$ ounces); Calories, 2941.

Thirteenth Day:

7.00 A.M. 1 soft-boiled egg; milk, 142 cc. (4⅔ ounces); zwieba 10 grams (2½ drams); butter, 4 grams (1 dra

9.00 A.M. Egg; sugar, 13 grams (3 drams); milk, 142 cc. ounces); scraped beef, 20 grams (5 drams); bo rice, 75 grams (2½ ounces); zwieback, 20 gra (5 drams); butter, 6 grams (1½ drams)

11.00 A.M. 1 soft-boiled egg; milk, 144 cc. (5 ounces); zwieba 10 grams (2½ drams); butter, 6 grams (1½ dra

1.00 P.M. Egg; sugar, 13 grams (3 drams); milk, 142 cc. ounces); cooked chopped chicken, 25 grams drams); boiled rice, 75 grams (2½ ounces); zwi back, 10 grams (2½ drams); butter, 6 grams drams)

3.00 P.M. 1 soft-boiled egg; milk, 144 cc. (5 ounces); scrap beef, 20 grams (5 drams); boiled rice, 75 gra (2½ ounces); zwieback, 10 grams (2½ drams); bu ter, 6 grams (1½ drams)

5.00 P.M. Egg; sugar, 14 grams (3½ drams); milk, 142 cc. ounces); cooked chopped chicken, 25 grams drams); boiled rice, 75 grams (2½ ounces); zwi back, 10 grams (2½ drams); butter, 6 grams drams)

7.00 P.M. 1 soft-boiled egg; milk, 144 cc. (5 ounces); zwiebac 10 grams (2½ drams); butter, 6 grams (1½ dram

Total: eggs (raw), 4, and cooked, 4; milk, 1000 cc. (33⅓ ounces sugar, 40 grams (1⅓ ounces); scraped beef, 70 grams (2⅓ ounces boiled rice, 300 grams (10 ounces); zwieback, 80 grams (ounces); chicken, 50 grams (1⅔ ounces); butter, 40 grams (ounces); Calories, 3007.

Fourteenth Day:

7.00 A.M. 1 soft-boiled egg; minced chop; buttered toast; mil 142 cc. (4⅔ ounces)

9.00 A.M. Boiled rice; buttered zwieback; custard; milk, 1 cc. (4⅔ ounces)

11.00 A.M. 1 soft-boiled egg; buttered zwieback; junket; mil 144 cc. (5 ounces)

1.00 P.M. Minced chicken; boiled rice; buttered zwieba custard; milk, 142 cc. (4⅔ ounces)

3.00 P.M. 1 soft-boiled egg; cooked scraped beef; boiled ric buttered toast; milk, 144 cc. (5 ounces)

5.00 P.M. Minced chicken; boiled rice; buttered zwieback; cu tard; milk, 142 cc. (4⅔ ounces)

7.00 P.M. 1 soft-boiled egg; buttered toast; milk, 144 cc. ounces)

enth Day—Continued:

l: eggs (raw), 4, and cooked, 4; milk, 1000 cc. ($33\frac{1}{3}$ ounces); ugar, 40 grams ($1\frac{1}{3}$ ounces); scraped beef, 70 grams ($2\frac{1}{3}$ ounces); oiled rice, 300 grams (10 ounces); zwieback, 100 grams ($3\frac{1}{3}$ unces); butter, 40 grams ($1\frac{1}{3}$ ounces); chicken, 50 grams ($1\frac{2}{3}$ unces); Calories, 3073.

can be seen, the diet after the first week is a very heavy volric one. Frequently, the quantity during the last few days have to be restricted in order to add to the patient's comfort, change to some other diet instituted. For satisfactory results, diet should be restricted to bed cases. Its efficacy is most unced in acute ulcers. Refer to Foods Lowest in Water and d Foods for further augmentation.

ppy Diet.—Sippy's claims were that continual neutralization of astric acid will completely heal the presenting ulcer. In addi- to a special neutralizing diet he strongly advocated the use of lies. Gastric washings nightly, to remove excess acid, were also cated.

ne choice of antacid therapy must vary with the patient and the progress shown. Provision should be made for an optimal ke of vitamin C (pp. 43, 83). Orange juice often cannot be n without the use of an antacid unless immediately preceded nilk. The orange juice should not be prepared until the patient ady to take it. A satisfactory routine for diminishing gastric ity involves the use of a nantacid at hourly intervals, after each ing. The antacid of choice is one of the aluminum hydroxide parations, with the addition of sufficient magnesium oxide or gnesium trisilicate to counteract the constipating effect.

he Sippy diet continues for a period of twenty-eight days and utlined as follows:

t to Tenth Day:

irst Day.	$\frac{1}{2}$ ounce each milk and cream hourly, 7 A.M. to 9 P.M.
econd Day.	3 ounces milk and cream hourly, 7 A.M. to 9 P.M.
hird Day.	3 ounces milk and cream hourly, 7 A.M. to 9 P.M.
ourth Day.	3 ounces milk and cream hourly, 7 A.M. to 9 P.M. 1 egg at NOON feeding
ifth Day.	3 ounces milk and cream hourly, 7 A.M. to 9. P.M. 1 egg at NOON; 1 egg at 5 P.M.
ixth Day.	3 ounces milk and cream hourly, 7 A.M. to 9 P.M. 3 ounces fine cereal at 7 A.M. feeding 1 egg at NOON; 1 egg at 5 P.M.
eventh Day.	3 ounces milk and cream hourly, 7 A.M. to 9 P.M. 3 ounces fine cereal at 7 A.M. feeding 1 egg at 9 A.M.; 1 egg at NOON 1 egg at 5 P.M.
ighth Day.	3 ounces milk and cream hourly, 7 A.M. to 9 P.M. 3 ounces fine cereal at 7 A.M. and 3 P.M. 1 egg at 9 A.M., NOON and 5 P.M.

First to Tenth Day:—Continued:

Ninth Day.	3 ounces milk and cream hourly, 7 A.M. to 9 P. Same as eighth day with 1 egg at 8 P.M.
Tenth Day.	3 ounces milk and cream hourly, 7 A.M. to 9 P. 3 ounces fine cereal at 7 A.M., 11 A.M., 3 P.M. 1 egg at 9 A.M., NOON, 5 P.M., 8 P.M.

Tenth Day to Third Week:

Same as above except that a small slice of toast with butter added at 11 A.M., 1 P.M., 3 P.M. and 5 P.M.

Third Week:

7.00 A.M.	Strained oatmeal with cream, 1 slice toast, 6 ounce milk and cream, juice of 1 orange
9.00 A.M	1 soft-boiled egg, 1 slice toast, 1 teaspoonful preserves, 6 ounces milk and cream
11.00 A.M.	1 raw egg with 6 ounces milk and cream
1.00 P.M.	1 spoonful mashed potato with butter, 1 slice toast with butter, 6 ounces milk
3.00 P.M.	Tapioca pudding with cream, 1 slice toast, 1 soft-boiled egg, 6 ounces milk and cream
5.00 P.M.	1 egg with milk, prune soufflé, 1 slice toast with butter
7.00 P.M.	Cream of Wheat with butter, apple sauce, 6 ounces milk and cream
9.00 P.M.	1 coddled or soft-boiled egg, 1 slice toast, 6 ounces milk and cream

Fourth Week:

7.00 A.M.	7 ounces milk and cream, ½ glass orange juice
8.30 A.M.	Well-cooked cereal with sugar and cream, 1 spoonful apple sauce, 1 poached egg on toast, glass of milk and cream
11.00 A.M.	Glass of milk and cream
12.30 P.M.	Oysters (panned, creamed or raw) or very tender meat or fish, baked or mashed potato with butter, toast, tapioca pudding with cream, glass of milk and cream
3.00 P.M.	Glass of milk and cream, ½ glass orange juice
5.00 P.M.	Glass of milk and cream, toast with butter and preserves
6.30 P.M.	Soft-boiled egg, Cream of Wheat with butter, 2 slices toast, rice pudding (no raisins) with cream, glass milk and cream
9.00 P.M.	1 glass of milk and cream, gelatin dessert with cream or small well-baked apple without core or skin

The milk and cream should be kept constantly cold. In hospitals very frequently the mixtures are made up for the day and kept in thermos jugs or in a pitcher surrounded by cracked ice.

horn Diet. Einhorn places emphasis upon complete gastric This is accomplished by the passing of the duodenal tube, at nd of which is attached a "bucket." It is through this tube frequent feedings are administered over a period of ten to en days. Barring symptoms of duodenal irritation or undue ss, the tube is left in place and not removed day or night for otal duration of the treatment.

oting from Einhorn, the following is the regimen: "The feeding st done at intervals of two hours. After the feeding, water then air is forced through the tube and the stopcock closed. ne feeding between 240 and 300 cc. of food can be introduced y. All fluids must, of course, be at body temperature. Usu- the following material is used every two hours from 7 A.M. 9 P.M.;—milk, 240 cc.; raw egg, 1; sugar of milk, 15 grams— mixture is well beaten up and injected at blood temperature. patient may be given, besides, 1 quart of physiological salt ion by rectum, according to the Murphy drip method, or may ve water directly into the duodenum very slowly drop by drop." he following is a detailed presentation:

EINHORN DIET.

Oatmeal	300 cc.
Eggs	7
Pea soup	720 cc.
Lactose	90 cc.
Butter	90 cc.
Barley gruel or barley water	180 cc.
Purée of potato	260 cc.

30 A.M.

Oatmeal gruel	180 cc.	6 ounces
1 egg		
Butter	15 grams	½ ounce
Lactose	15 grams	½ ounce

30 A.M.

Pea soup	180 cc.	6 ounces
1 egg		
Butter	15 grams	½ ounce
Lactose	15 grams	½ ounce

30 A.M.

Same as 9.30 A.M.

30 P.M.

Purée of potato	180 grams	6 ounces
1 egg		

30 P.M.

Oatmeal gruel	180 cc.	6 ounces
Butter	15 grams	½ ounce
Lactose	15 grams	½ ounce

5.30 P.M.		
Same as 9.30 A.M.		
7.30 P.M.		
Barley gruel	180 cc.	6 ounces
1 egg		
Butter	15 grams	½ ounce
9.30 P.M.		
Purée of potato, 1 . . .	180 cc.	6 ounces
1 egg		

It is not uncommon to encounter patients with a definite intolerance to milk, which may be purely psychic or allergic. Kast has recommended the substitution of almond milk. Einhorn feeding can be given either orally or through the duodenal tube. The modification which we have observed has been the omission of bouillon from the dietary and the substitution therefor of thin potato purée made without milk.

Meulengracht Diet.—This diet is highly regarded for the management of bleeding peptic ulcer. It differs from other routines in that it includes liberal amounts of food from the beginning of the treatment. Iron medications and antacid-antispasmodic agents supplement the diet.

The Original Meulengracht Regimen.

"Puréed Diet."

6 A.M. Tea, bread and butter
9 A.M. Oatmeal with milk, bread and butter
1 P.M. Main dishes—meat balls, timbales, broiled chops, omelets, fish balls, vegetable gratin, meat gratin, fish gratin, etc., mashed potatoes and vegetable purées
Soups
Puddings
3 P.M. Cocoa
6 P.M. Sliced meats, cheese, etc.
Bread and butter
Tea

The bread is white bread.

Patients are allowed as much as they wish.

Boyd and Schlachman (1938) have modified this procedure in the following manner:

Breakfast: *Cream of Wheat*, farina, *Puffed Rice* or strained cereal; Eggs any style, bacon, white bread toasted with crust removed; tea or coffee with milk or cream and sugar

Lunch: Baked macaroni and cheese *or* buttered spaghetti or creamed eggs on toast; egg salad sandwiches (mixture of egg and mayonnaise only), cream cheese and jelly sandwiches; steamed rice; white bread and butter; custards, gelatin desserts, plain or flavored cornstarch pudding; coffee, tea, milk and sugar

: Cream soups; baked, boiled or mashed potatoes; puréed ables (spinach, peas, carrots), white meat of chicken, scraped lamb chops, roast lamb, white fish; white bread, butter, rts and beverages as for lunch

esen Diet.—This procedure utilizes a gelatin-milk mixture for nagement of gastric hemorrhage.

Feedings After Gastric Hemorrhage.

For patients immediately after hematemesis
No feedings while patient is asleep
No ice, water or other drinks to be given
Water, beginning on fifth day, increasing amounts starting with 1 ounce at a time
Mineral oil, ½ ounce each night, beginning on second night
Iron and vitamin preparations as indicated

Gelatin-milk Mixture.

(To be given cool or warm.)

	Amount.	Carbohydrate.	Protein.	Fat.	Calories.
n	30 gm.	..	27	..	100
e	60 gm.	60	..	..	240
(20 per cent) . .	100 cc.	3	3	18	180
. . . .	900 cc.	36	27	27	550
		99	57	45	1000 (approximately)

First and second days: 4 ounces every 1½ hours
Third, fourth and fifth days: 5 ounces every 2 hours
Sixth and seventh days: 6 ounces every 2 hours
Add to each of four feedings one of the following:
1 soft-boiled or poached egg
3 ounces of cereal
Custard, jello or ice-cream
Eighth and ninth days: As above with 2 extras added to each of three feedings
Tenth day and thereafter: Ulcer diet

Andresen Ulcer Diet.

kfast:
ilk, 1 glass
real, full dish with cream and sugar
g, soft-boiled or poached
ead or toast and butter
uit juice (at end)

norning:
lk, 1 glass (with added cream and glucose, if desired)
ackers, bread, cake or jello

Andresen Ulcer Diet.—*Continued.*

Luncheon:
Milk, 1 glass
Egg, soft-boiled or poached or cream cheese
Potato, baked or mashed or plain spaghetti
Vegetables, strained or mashed
Bread and butter
Pudding, jello, ice-cream or stewed fruit

Midafternoon:
Same as midmorning

Supper:
Same as breakfast or luncheon

At bedtime (and during night every two and a half hours if aw
Same as for midmorning

Salt is permitted but no other condiment
The drinking of at least 6 glasses of water per day is insisted upon
Olive oil, ½ ounce three times daily before feedings is usually prescribed and mineral oil ½ ounce at bedtime
Vitamins, iron, calcium and phosphorus are added as indicated

New York Post-Graduate Hospital.—The procedure used for ul cases is as follows:

Routine Ulcer Management:

1. Bathroom privileges
2. Weigh the patient at the beginning of the treatment and wee thereafter
3. Antacid and other medications are not routine but orde individually for each patient
4. Aspirations are to be ordered individually as necessary

Suggestions for Service:

1. The eggs may be used with milk and cream, as eggnog, or s boiled
2. The cereal may be *Cream of Wheat*, farina or strained rolled o
3. The puréed peas may be added to the milk and cream a heated as a cream soup
4. The orange juice should be strained and either added to milk or diluted with one-half water
5. The pudding may be cornstarch, rice, tapioca or baked cust
6. A small amount of sugar may be used with the cereal and eggnogs
7. Water is allowed as desired between meals but none with m

8 A.M. . . .	½ glass milk and cream	+ an egg	+ an egg	+ an egg	+ an egg	+ an egg	+ an egg	+ an egg	+ an egg
9 A.M. . . .	½ glass milk and cream							+ 3 T. cereal	+ 3 T. cereal
10 A.M. . . .	½ glass milk and cream						+ 3 T. cereal	+ an egg	+ an egg
11 A.M. . . .	½ glass milk and cream							+ 3 T. puréed peas	+ 3 T. puréed peas
12 noon . .	½ glass milk and cream			+ an egg	+ 3 T. cereal	+ 3 T. cereal	+ an egg	+ 3 T. mashed potatoes	+ 3 T. mashed potatoes
1 P.M. . . .	½ glass milk and cream			+ 2 T. orange juice	+ 2 T. orange juice	+ 2 T. orange juice	+ 2 T. orange juice	+ 4 T. orange juice	+ 4 T. orange juice
2 P.M. . . .	½ glass milk and cream					+ an egg	+ 3 T. cereal		+ 3 T. pudding
3 P.M. . . .	½ glass milk and cream							+ 3 T. cereal	+ 3 T. cereal
4 P.M. . . .	½ glass milk and cream				+ an egg	+ an egg	+ an egg	+ an egg	+ an egg
5 P.M. . . .	½ glass milk and cream							+ 3 T. cereal	+ 3 T. cereal
6 P.M. . . .	½ glass milk and cream		+ 3 T. cereal	+ 3 T. cereal	+ 3 T. cereal	+ 3 T. cereal	+ 3 T. cereal	+ 3 T. pudding	+ 3 T. pudding
7-8-9-10 P.M.	½ glass milk and cream								

One-half glass of equal parts of milk and 20 per cent cream is given hourly from 8 A.M. to 10 P.M. for the twenty-eight day period.

Dietary Management:

1. For a period of twenty-eight days, feedings are given h[ourly] from 8 A.M. to 10 P.M. as shown in Table 35.
2. For twenty-one days all food is served from the ward pa[ntry] as shown on schedule (p. 555).
3. Starting with the twenty-second day, breakfast, dinner [and] supper are served from the diet kitchen and hourly fee[dings] of milk and cream are continued from the ward pan[try]. This diet follows:

Breakfast: 8 A.M.
- Cooked cereal with cream and sugar
- Soft-boiled, poached or scrambled egg
- Toast with butter
- One-half glass strained orange juice
- Milk *or* weak coffee with cream and sugar

Intermediate feedings: 9 A.M., 10 A.M., 11 A.M.
- One-half glass of milk and cream

Lunch: 12 NOON.
- Cream soup
- Scraped beef, minced lamb, chicken or fish
- Baked *or* mashed potato
- Vegetable purée
- Bread with butter
- Custard, cornstarch, rice *or* tapioca pudding
- Milk *or* weak tea with cream and sugar

Intermediate feedings: 1 P.M., 2 P.M., 3 P.M., 4 P.M.
- One-half glass of milk and cream

Supper: 5 P.M.
- Macaroni, noodles, rice or cereal with butter
- Soft-boiled, poached or scrambled egg
- Bread with butter
- Custard, pudding *or* fruit purée
- Milk or weak tea with cream and sugar

Intermediate feedings: 6 P.M., 7 P.M., 8 P.M., 9 P.M., 10 P.M.
- One-half glass of milk and cream

Bridges' "Convalescent Ulcer" Diet.—Generally, in mild ulcer[s a] strictly measured diet is not at all necessary. The practitio[ner] must bear in mind the general underlying principle and prescrib[e a] diet compatible with the presenting conditions.

In general, the following foods should be positively *forbidden:*

Alcoholic beverages	Broccoli
Beans, baked	Broths
Beef extracts	Brussels sprouts
Bouillon	Cabbage
Bran	Candy, except hard candies
Bran-mixed cereals	Canned meats and fish

nated beverages	Onions
p	Paprika
	Pastry
sauce	Peppers, red and green
, except as flavoring	Pickled foods
e substitutes	Pickles
mmé	Pies, fruit
	Raw fruits
mbers	Rhubarb
ve	Salt meats
foods	Sauerkraut
juice, except as advised	Spices and seasonings
ly seasoned foods	Stock soups
rolls, muffins, etc.	Tomatoes, raw and cooked
s	Turnips
ice	Vegetables, raw
tard	Vinegar

andy list of *advised foods* to be given for interval feedings as er case progresses can be assembled from the following:

ad pudding, plain	Eggnogs
termilk	Fermented milks
omalt	Gruels
colate beverages	Ice-cream
tage cheese	Junket
ckers and milk	Malted milk
ckers and ½ milk, ½ cream	Milk shake
am	Milk toast
am cheese	Milk, ½; cream, ½
am soups	Ovaltine
stards	Rice

se interval feedings may be given at midmorning, midafter- or bedtime.

lowing is to be found a practical "convalescent ulcer" menu is free from the recognized gastric irritants. This menu may be utilized in post-operative ulcer cases. It is particularly le for the ambulant patient.

Typical Menu.

fast:

oked cereal with cream and sugar
, except fried, *or* crisp bacon
ast with butter
t milk flavored with coffee and sugar
nge juice

Typical Menu.—*Continued.*

Luncheon:

Meat, fish *or* eggs
Potatoes, macaroni, noodles, rice, spaghetti *or* vermic
butter
Puréed vegetable
Bread with butter
Puréed fruit
Milk

Dinner:

Cream of vegetable soup
Meat or fish
Potato
Puréed vegetable
Bread with butter
Simple dessert
Milk

NOTE.—Smoking or other uses of tobacco should be stringe
prohibited. Needless to say, alcoholic beverages or foods contai
alcohol should never be prescribed. Refer to Bland Foods and
Foods for further details.

UNDERWEIGHT.

Discussion.—The building-up of the individual who is underwei
in the absence of disease resolves itself into an analysis not onl
the previously observed dietetic regimen, but also of the daily hab
If the underweight ingests food of sufficient caloric value to
above a maintenance level and at the same time too rapid cat
olism of this food is prevented, weight will be gained. The corr
tion of improper habits, nervous exhaustion, irregular hours
meals, excessive exercise, excessive smoking and the commo
presented mental anorexia, will all tend to aid the purpose to
accomplished. Very frequently it is impractical and might
detrimental to completely correct all these irregularities at
outset, but, in general, a more prompt result will be accomplis
by their eradication.

Hospitalization, as a rule, particularly in a general hospital,
not proved satisfactory. The admittance to a sanitarium or sm
nursing home has been found to be productive of better resu
The immediate institution of a diet excessively high in cal
intake, in the majority of cases, is detrimental and frequen
provokes a distaste for food which later is difficult to overcome.

Under an ideal regimen the prescribed caloric intake should v
between 4000 and 5000 Calories *per diem*. The carbohydrate c
tent should represent about 2000 Calories or more. Proteins sh
be offered to the amount of about 100 grams. The balance c
readily be obtained by the infiltration of fats.

ıainstay of the diet is milk, cream, butter, bacon, breads etables of high caloric value, such as peas, lima beans, rice, i, spaghetti, etc. The addition to the diet of concen- ods such as malted milk, dried milks and olive oil, at times ielpful.

w of the fact that a high caloric intake is desired, all the ould be concentrated in order to obviate excessive volumetric n. Refer to Foods Lowest in Water.

val feedings at mid-morning, mid-afternoon and bedtime ful, particularly when sufficient caloric value is not taken ar meal-times.

y, low-caloric vegetables
onated beverages
soups

Oversweet foods
Pickles

various salad greens may be used as a garnish.

l as dietary supplements:

ados
olate
s
es

Soda fountain items, as
- Milk shakes
- Malted milk with egg
- Sundaes

Typical Menu.

fast:

it
ked whole grain cereal with cream and sugar
le grain toast *or* rolls with butter and marmalade
milk flavored with coffee and sugar *or* cocoa

norning:

nog

eon:

am of vegetable soup
at, fish *or* eggs
oked vegetable with extra butter
it, vegetable *or* cheese salad with oil dressing
ole grain bread with butter
wed fruit with cream
k *or* cocoa

afternoon:

it juice with lactose, sweet crackers

Typical Menu.—*Continued.*

Dinner:
Meat *or* fish
Potato with extra butter
Cooked vegetable with extra butter
Whole grain bread with butter
Simple dessert
Milk

Bedtime:
Eggnog *or* milk with buttered crackers

NOTE.—Butter, cream, olive oil, syrups and jams and marma[illegible] should be infiltrated into the diet wherever possible.

The requisite liquid content *per diem* is to be derived from li[illegible] of caloric value such as milk, orange juice, orange albumen, cho[illegible] made with milk, etc. Water, as such, should be used as littl[illegible] possible.

Suggestions.—In those patients in whom there is a menta[illegible] allergic intolerance to milk this can frequently be overcome by [illegible] tonization or acidulation. The prescription of Fermillac, Zo[illegible] and other specially prepared milks furnishes variety and at the sa[illegible] time sufficient caloric value to be practical.

Frequently, the author has found it of value, particularly in [illegible] course of long-standing cases, to allow the patient one day a w[illegible] of freedom from diet. During this day the patient may cho[illegible] whatever is desired, both in respect to quality and quantity.

Exercise should not be omitted but should be prescribed in mod[illegible] ation. Walking is most universally satisfactory. Golf, when av[illegible] able, is excellent if not indulged in to excess. The institut[illegible] of calisthenic exercises and massage for general body tone can [illegible] quently meet all requirements.

In the reduction and the building of weight, the mental attit[illegible] of the patient is primarily essential for success. Repeatedly, [illegible] European spas show magnificent results in the care of Ameri[illegible] citizens. This can be attributed to the isolation dependent u[illegible] several thousand miles from business and domestic cares, [illegible] companionship offered others desirous of accomplishing the sa[illegible] purpose and the general inability, on the part of the patient, [illegible] practise non-observance without falling from caste. These c[illegible] ditions, with few exceptions, do not prevail in this country.

Increasing Weight With Insulin.

JAMES J. SHORT, M. D.

Use in Non-diabetic Patients.—Whether used in diabetic [illegible] non-diabetic cases, insulin tends to increase weight. This is pro[illegible] bly due, in part at least, to the increased appetite which it engend[illegible] Under its influence in the non-diabetic a greater amount of f[illegible] is almost certain to be consumed. This fact has led to its [illegible]

nt for a number of years in cases of malnutrition. In 1927, iter published a preliminary report of his experience in this In one case reported after insulin was begun there was an se from 61 pounds to 90 pounds in a period of approximately eks. All previous attempts to increase weight in this patient together failed. Such results are not unusual. Cases which een thus treated in this country and abroad range from simple ion, psychasthenia and mental disorders to grave organic con-s, such as tuberculosis and the rapidly wasting diseases of ood. Reports generally have been favorable although com-failures have been recorded.

ger experience with insulin in the attempt to force nutrition te that early temporary success may be expected. A gain of nore lbs. in the first week or two is not uncommon. After that atient usually becomes refractory and fails to respond to n even in doses of 40 units daily. This is probably explained reduction in the amount of insulin produced by the patient's eas, a state of latency having been induced by the substitu-herapy. Periodic interruption in the treatment will often pre-this undesirable development and lend greater success to the procedure.

et.—It is essential to take fullest advantage of the hunger ndered by the insulin. For this purpose, a food mixture in n there is a large proportion of fat would seem logical. As atively small amount of sugar is sufficient to antidote promptly e of insulin and thus inhibit the food craving, it would seem that e attempt to increase weight a food combination low in sugar of a high-caloric value in relation to weight and bulk should be ted. Such a diet capitalizes on the intense hunger to the great-xtent by inducing the subject to partake of a large amount of ht-producing foods. In the majority of underweight cases it is ably not an alteration of metabolism which is desired primarily, rather the ingestion of a larger amount of food. At the same there is evidence to indicate that a more rapid and complete rption of food from the alimentary tract is brought about.

sage of Insulin.—Experience has indicated that it is better ve the insulin about one-half hour before each meal in order low time for hunger to develop, as this interval usually produces ntense food craving without other alarming symptoms asso-d with hypoglycemia. The patient should always be warned ver, of what these symptoms are and how to combat them, as e treatment of diabetes.

though good results were usually obtained with the use of ar insulin, this was not universally the case in the writer's rience. Much better and more consistent results have been ned, however, with the use of protamine-zinc insulin. An ge dose is 20 units before breakfast.

intaining Weight.—It seems to be a relatively simple matter to tain weight once it has been acquired. A better habit of eating een established during the insulin period, and the patient will

usually continue to ingest sufficient food to hold the increa necessary, an occasional short course of insulin therapy for th pose may be given. When the appetite is markedly limited been found beneficial to restrict all fluids to calorie-bearing only.

Effects on General Metabolism.—Bailey found no increase in metabolic rate after insulin, although an increase in the respir quotient was commonly observed. This indicated an incr oxidation of carbohydrate. A decrease in liver glycogen has found by MacLeod in normal animals after the administrati insulin. It must be remembered, however, that there is a recip relationship between the glycogen stores in liver and muscle, that a decrease in one usually means an increase in the other. A diabetics, there is good reason to believe that insulin does incr the total glycogen stores in the body, and that later these are in converted into fat.

UPPER RESPIRATORY CONDITIONS.

ARTHUR NILSEN, M.D.

Discussion.—The importance of healthy, well-nourished tissue defensive barriers to infections of the upper respiratory tract ears has long been a matter of common knowledge. It has b only of late years, however, that the discoveries of the vitam with the ensuing exhaustive experimental and clinical research i their properties has focused the attention of the oto-laryngolo on the importance of diet. This is especially true in relation the infections of the sinuses and ears in children. Dean, Stuc Shurly and others have demonstrated conclusively that diet deficiencies, especially in vitamins A and D, are predisposing f tors of the utmost importance in the incidence and persistence acute and chronic sinusitis and otitis in children. More recen vitamin-C deficiency has been demonstrated in many cases of ot media. Refer to Vitamins and The Vitamin Deficiencies.

The correction of dietary errors alone, has proved of no av in the treatment of chronic infections of this type, and likewi nasal therapy and surgery by themselves are futile and ineff tive in the presence of dietary insufficiency. It is imperative t the oto-laryngologist and the internist realize the importance coöperation in these cases. Satisfactory results are obtainable o by proper local treatment and careful dietary regulation. W this applies to chronic infections, Dean and Daniels have dem strated clinically that cases of incipient nasal infections can favorably affected by a vitamin-rich diet. Although the pro data on this subject apply only to children, it is undoubt true that similar considerations obtain in adults but to a les degree.

Experiment has shown that the most important protective f are the natural whole grains, milk, eggs, green vegetables and fr Stucky and Daniels suggested the following as a satisfactory d for a child suffering from chronic sinusitis: 1 quart of milk a d

bles (not potatoes), cereals, 3 fruits, 1 of which is raw, neat for older children. If there are definite signs of vita- eficiency, 1 or 2 teaspoonfuls of cod-liver oil are added. tis gives as a sample diet: 1 quart of milk a day; 1 or 2 eggs, f vegetables, fruit juices and fruits; 1 tablespoonful of but- each meal, meat or fish once a day for older children and ition of cod-liver oil or a concentrated preparation of vita- and D. Refer to the High Vitamin Diet (p. 48).

Infections.—Acute infections of the nose, throat and ear, the swallowing mechanism is not affected, offer no particu- ary problems and are handled in the same way as similar ns elsewhere. When difficulty in swallowing is present, as in *acute tonsillitis, streptococcic infections, peritonsillar abscess* ilar conditions in which ulceration, infiltration and abscess on interfere with deglutition by pain or mechanical obstruc- both, proper nourishment becomes an important factor in cessful handling of the case. Every effort must be made, lly in cases of long standing, to supply a diet balanced as to ydrates, fats and proteins in sufficient amounts to satisfy oric needs of the individual. Due to the toxemia and pain ort when swallowing, these patients are usually without desire od. Unless rigid supervision of diet and insistence on an te minimum are made imperative, resistance is lowered by tion and dehydration. If a twenty-four-hour check-up is t is surprising to see how little fluid and nourishment many ases receive. The result is a lowering of the powers of resist- which may well lead to an unfavorable outcome or at least g the infection and delay convalescence.

le fluids are the easiest form of nourishment to swallow it ten be found that semi-solids are as readily taken. A suit- iet consists of beef juice; beef, lamb or chicken broth; eggs, in the form of eggnogs or custards; carbohydrates in vege- purées, blanc-mange, cereals, gruels and honey; fats as butter eam. Milk as such is often distasteful since it lingers on mucous es and leaves an after-taste, but in various combinations it an important item. Cold foods are better taken than hot. nt water is imperative. Refer to Fluid Foods and Soft

pain of ulcerated mucous membranes may be relieved by of non-toxic local anesthetics, such as orthoform, or anesthe- fore feeding, in the form of lozenges or insufflation. Weak ns of cocaine may be used guardedly, if the need is urgent. nden's position, in which the patient lies with his head over d of the bed and sucks food through a tube from a container below, is of value in painful ulceration at the base of the and larynx. Pressure over the ears and sides of the neck palms of an assistant during the act of swallowing may give

more severe cases feeding by tube is necessary. This may be l stomach or duodenal tube, passed through the mouth in the

usual way, into the esophagus or stomach. A nasal tube, wh[illegible] often better borne, may be used and may be left *in situ* be[illegible] feedings.

In all throat infections there is a marked tendency towa[illegible] dirty mouth and coated tongue and teeth, which must be [illegible] for by frequent and careful swabbing of the mouth and scra[illegible] of the tongue with a piece of whalebone, especially before fee[illegible] Dry lips are treated with cold cream or vaseline, not glycerin.

Typical Menu.

Breakfast:

Fruit juice or puréed fruit
Cooked cereal with cream and sugar
Soft-cooked egg
Milk *or* coffee with cream and sugar

Luncheon:

Cream of vegetable soup
Minced meat
Puréed vegetable
Puréed fruit
Milk or cocoa

Dinner:

Strained soup
Minced meat
Mashed potato
Puréed vegetable
Soft dessert
Milk *or* coffee with cream and sugar

Chronic Infections.—Chronic conditions presenting dietary pr[illegible] lems are those complicated by dysphagia due to ulceration, tu[illegible] mass, stricture or combinations of these, to which may be ad[illegible] diphtheritic paralyses, spasmodic and paralytic neuroses of vari[illegible] origins. The commoner diseases presenting these conditions [illegible] tuberculosis, syphilis, malignancies of various types; trauma[illegible] strictures of the esophagus, etc. In general, the principles of fe[illegible] ing in acute infections also apply here. Adequate caloric intak[illegible] vital, as inanition and toxemia are usually present. The na[illegible] feeding tube is invaluable in severe cases and in the most advan[illegible] conditions gastrostomy for feeding purposes must be consider[illegible] Refer to Artificial Feeding, also Esophageal Stenosis.

Pre-operative Diet.—The general surgical principles of prepa[illegible] tion for anesthesia are the same in oto-rhinologic cases as [illegible] surgery elsewhere. Due to the fact that in certain cases, howev[illegible] difficulty in post-operative swallowing may seriously limit the amo[illegible] of fluid and food ingested for a time, special pre-operative prec[illegible] tions are necessary. This is especially true of children predispo[illegible]

sis, in whom a diet rich in carbohydrates is indicated prior llectomy. In addition, 50 cc. of glucose in 200 cc. of orange ay be given in divided doses during the twenty-four hours ng anesthesia and may be repeated afterwards if symptoms sis are present.

ajor operations, such as laryngectomy, it is imperative that s undergo a thorough preoperative metabolic study, and that te dietary and therapeutic measures be instituted to correct etabolic imbalance before operation. Patients in this catere frequently in poor condition, due to inanition, toxemia, id their natural powers of resistance are at best much diminand everything possible must be done to send them to the ing table with a maximum chance for recovery. The diet be one which is low in fats and high in carbohydrates. Refer dosis and Post-Laryngectomy Diet.

t-operative Diet.—Following tonsillectomy in children, the t may take cool water freely as soon as the anesthetic has off. Four or five hours later, if vomiting is not present, is given. Milk in every form is generally withheld for the twenty-four hours. The diet can usually then be rapidly sed, depending on the amount of gastric disturbance, as en seldom complain of difficulty in swallowing. In adults, ver, dysphagia is usually severe and for several days the diet consist of fluids and semi-solids. Heat is more desirable than Raw, unflavored milk is often distasteful as it leaves an asant after-taste and clings to the raw surfaces. Eggnogs, eam, custards, cereals, jellies, purées and soups, lemon and geade with whites of eggs form the base of a satisfactory diet. r to Liquid Foods and Soft Foods for further elaboration.

eding the laryngectomy and other major operative patients res constant insistence on adequate caloric and fluid intake. feeding at first is by nasal catheter which is introduced into sophagus at the time of operation and usually remains *in situ* wo weeks or more. Food is, of course, in liquid form and is duced into the tube by syringe or funnel. Refer to Supplеary Methods of Feeding. After the gastric disturbance folg anesthesia is allayed, a full diet as suggested under acute tions is instituted and maintained as far as gastric tolerance permit. A basic daily minimum of various food elements is planned as follows: the juice from 1 pound of beef, ½ pint of n, 1 quart of milk, 2 eggs and 1 pint of cooked cereal. The mainice of the patient's strength and resistance by a full, balanced is a factor as important as the skilful operation. It must not rgotten that the important element, sodium chloride, should lded, particularly where a natural thirst is lacking. Additional in is most readily available as egg-whites.

UREMIA.

Refer to page 249.

URIC-ACID DIATHESIS.

Discussion.—By uric-acid diathesis is meant the presence of increased blood uric acid, with or without demonstrable c manifestations.

The time-worn adage of "too much acid in the blood" bega lose its popularity coincident with the advent of blood chem Many were the symptoms that were attributed to "too much in the blood," until proper blood uric-acid analysis was avail Since that time the multiplicity of symptoms attributed cifically to an increase of blood uric acid has diminished.

However, in "uric-acid diathesis" the blood uric acid alo increased coincident with the normal maintenance of other bl factors, *i. e.*, urea nitrogen, non-protein nitrogen, creatinine, su etc. It is well recognized that the first blood element to be eleva in the system, in the presence of renal insufficiency, is uric acid, a one must differentiate between uric-acid diathesis and incip renal disease.

The abnormal increase of uric acid in the human body is attr utable to overingestion of nucleins, impaired renal function, fau metabolism of the same or a combination of the latter two. U acid is derived from purin bodies which are linked to prote These purin bodies exist in many of our foods, especially those animal origin. Nevertheless, the human body is capable of prod ing its own purin body derivatives while on a purin-free diet.

However, no definite offending cause has been determined for t accumulation of uric acid in human tissues. By some, its accumu tion has been attributed to selected renal retention, by others faulty hepatic metabolism. The addition of exogenous purins co tributes to uric-acid retention.

The mode of origin of uric acid from nucleic acid through t purin bases is as follows:

Purins undergoing metabolism in the body may be derived eith (1) from the nucleoprotein of body tissue or (2) from the food whi may contain both nucleoproteins and free purins. Sometimes t term "endogenous uric acid" is applied to that fraction having t former origin, while "exogenous uric acid" indicates that fracti which is directly due to the food. The endogenous uric acid in t urine of a man of average size usually amounts to about 0.3 to gram per day; the exogenous varies from mere traces to 1 or ev 2 grams, according to the kind or amount of food consumed. On ordinary mixed diet the total excretion of uric acid by the kidne averages about 0.6 to 0.7 gram per day. The usual daily range about 0.5 to 1 gram of uric acid per day, in which case the ur acid nitrogen constitutes about 1 to 3 per cent of the total nitrog of the urine.

The foods highest in purin bodies are of animal origin. T more multinuclear the animal food, the higher the purin conte is thought to be. The purin content of foods may be said to va directly with their specialization of function. For example, bra

and liver have been demonstrated as being higher in purin than that of muscle. Beef-tea, stock soups and meat contain the same kind of purin and extractives but in a ncentrated form than the substances from which they come. ble foods, especially of the seed variety, as lentils and asparar relatively high both in purin bodies and amino-acids. Coffee, oa and chocolate contain methylated purins the fate of which ewhat controversial. Although coffee and tea have been inadvisable, there is generally little objection to cocoa or ite.

iew of the fact that the solubility of uric acid in water is ably low, but is increased in alkaline media and reversely so l media, it is advisable to institute a purin-free alkaline-ash Additionally, the dietary regulation should be such that s associated a general flushing by fluids of an alkaline nature. primary offending factor in the accumulation of uric acid in unan body is the ingestion of alcohol. Differentiation has attempted by continental authorities, wherein they lay the r blame on alcohol contained in hard liquors and sanction the d ingestion of certain wines. This view has not been accepted nerican investigators.

dietetic treatment of uric-acid diathesis consists of low-purin, t, moderate protein, and high-carbohydrate intake.

Foods Practically Purin-free.

eese	Gelatin
eam	Milk
gs, fresh	Most vegetables
uits	Processed cereals

Foods Low in Purins.

paragus	Celery
iled meats, separated	Onions
rom fluid	String beans

Foods Moderately High in Purins.

oths	Muscle tissues of meat, fish,
avies	poultry
gumes	Spinach
ushrooms	Yeast

Foods Outstandingly High in Purins.

Glandular organs

Typical Menu.

kfast:
uit
ereal with milk and sugar
ast *or* rolls with butter
ilk *or* hot milk flavored with coffee and sugar *or* cocoa

Typical Menu.—*(Continued.)*

Luncheon:
- Cream of vegetable soup
- Choice: potato, macaroni, noodles, rice, spaghetti *or* vermi- with butter
- Cooked vegetables
- Salad
- Bread with butter
- Fresh *or* stewed fruit
- Milk

Dinner:
- Eggs *or* boiled meat or fish
- Potato
- Cooked vegetable
- Salad
- Bread with butter
- Choice: custard, junket, gelatin; cornstarch, rice, sago, tapio- pudding
- Milk

Suggestions.—It is recommended that the fluid intake per da be increased and be augmented by some authentic alkaline wate In overweight patients those foods of high caloric value should b replaced by those with a lower caloric yield.

UROLOGIC DISEASES

Clarence G. Bandler, M.D., F.A.C.S. and Philip R. Roen, M.D

Discussion.—Certain systemic ailments among which are meta- bolic errors, the imbalance of concentration of various salts in th tissue fluids, the water content of the body, as well as specif urinary tract disease including calculosis and bacterial invasion ma be benefitted by proper dietotherapy. In general, too, one mu not forget that the kidney has a significant part in the dietar management of all diseases.

General Principles

Fluid output is one of the two basic functions of the kidney Normal urinary output varies from 1200 to 3000 cc. daily, dependin upon fluid intake. Thus, water is seen to be a diuretic in its ow right. Dehydration must be prevented in any disease, and may b overcome by providing fluid administered by mouth or parenterally In frequent association with urologic disease, there is nitroge retention in the blood resulting from renal functional impairmen In such cases of azotemia, it is not only important to increase th urinary output as a method of excreting blood non-protein nitroge but it is also important to reduce the protein intake temporarily In azotemia, the diet should contain only the minimum amount o protein to maintain nitrogen equilibrium, *i. e.*, 40 grams per day

mainder of the caloric requirement may consist of a larger ydrate intake. When normal renal function has been re- at least 70 grams of protein should be given daily (normal requirement = 1 gram per kilogram of body weight).

e same principles must be adhered to in giving amino acids n hydrolysate) either by mouth or parenterally as a sub- for adequate protein intake. Thus when employing hydro- protein in cases where renal functional impairment and ni- retention are present, not more than 1 liter of the 5 per cent n (50 gms.) should be given until such time that the kidneys ndle their normal burden.

retion of Salts.—The kidneys regulate the acid content (all except carbonic acid which is excreted through the lungs) e alkaline content of the body. This change in the acid-base e of the body fluids is accomplished by change in the acidity urine—when blood acidity increases, a more acid urine is ced thus eliminating both organic and inorganic acid radicles. rly, when there is an increase in the blood alkalinity, a more ne urine is excreted. Such delicate balance is accomplished e most part by varying the amount of acid or basic phosphate ted in the urine. Fixed base is saved for body fluids by the tion of an acid urine, and by a second mechanism, the renal ion of ammonia as a substitution product for fixed base. The ry acidity can range from the pH extremes of 4.6 to 8.0; within ange the kidneys can, by their selective action, excrete excess excrete excess alkali, or retain fixed base for the body by the facture of ammonia.

gested food has either acid or base forming qualities depending whether acid (SO_4, PO_4, Cl and organic acid radicles) or her basic (Na, K, Ca, Mg) radicles predominate in the ash or ue resulting from metabolic processes. Generally, meats, nd cereals tend to be "acid-ash" while fruits and vegetables a basic residue—"alkaline-ash." However, the relationship od and urinary reaction are not exact—the pH of the urine ghout the twenty-four hours of the day is quite variable al- gh fluctuating at a mean of about pH6. It is quite difficult, or ps impossible, to maintain a constant given pH either by food drugs, particularly when there is renal parenchymal disease, lney infection especially in the latter cases where urea-splitting isms are present and ammonia is produced through the

nposition of urea $[CO(NH_2)_2 \xrightarrow{H_2O} CO_2 + 2NH_3]$. For these

reasons, the pH of the separate kidney urines and the bladder may vary widely especially in unilateral renal problems. over, it must be remembered that increasing the fluid intake to raise the urinary pH, while limiting fluids tends to lower H (increase the acidity).

nary reaction may be altered by drugs or by diet, or by both ned. For acidification of the urine, drugs generally employed

are sodium acid phosphate (2 grams daily) or ammonium chl... (2 to 6 gms. daily). The acid-ash diet (see below) is preferab... the so-called "ketogenic diet" because the latter is so unpalata... and unacceptable to the patient. For alkalinization of the uri... potassium citrate (2 to 4 grams daily) or sodium bicarbonate (4 to... grams daily) is used; an alkaline-ash diet is employed as an adju... to this end.

Urinary Sedimentation and Calculus Formation.—Stone-form... salts which are only slightly soluble in the urine remain in soluti... because of a number of interdependent factors. A so-called "coll... protective mechanism" has been postulated to explain the urina... solubility of crystalloids, but more recent investigation has show... that the solubility factors of salts are dependent upon the acidi... of urine, urinary volume, the concentration of sodium chloride an... other neutral salts together with certain other mechanisms whi... are at present unknown. Of these, the most important factors a... the acidity of the urine and urine volume. Surely the best pro... phylactic in the prevention of urinary sedimentation and ston... formation is a large urine output and a resultant dilute urine.

When crystalloids precipitate in the urine producing a sedimen... (phosphaturia, uraturia, cystinuria and oxaluria), some change i... the urine solubility factors has occurred. This means that ther... need not necessarily be an increase in the concentration of thes... salts; one (or more) of the solubility factors has been altered t... produce the abnormal precipitation.

Phosphaturia.—An alkaline urine which is quite turbid may b... passed in perfectly healthy persons. The cloudiness disappear... entirely when the urine is acidified. The turbidity in these cases i... due to calcium and magnesium phosphates which have been pre... cipitated because of excess excretion. Treatment of this conditio... is relatively simple: acidification of the urine by an acid-ash die... (q. v.) and acidifying medication, and by increasing the urin... volume through increasing the fluid intake.

Uraturia.—The precipitation of uric acid or its salts (sodium... potassium and ammonium) occurs only in an acid urine. Crystal... characteristic of this condition may be found on microscopic ex... amination of the urine. Pure uric acid calculi are not visible on th... x-ray film and, consequently, diagnosis of their presence is difficult... However, at times showers of uric acid crystals can produce rena... colic; such a possibility must not be overlooked clinically. More... over, the blood uric acid level is generally of no diagnostic value fo... it is rarely increased in these cases.

In the treatment of this urinary uric acid precipitation, a low... purin diet is prescribed (see Gout) in addition to making the urin... either alkaline or "less acid" by increasing alkaline residue food... (milk, fruits, vegetables). Moreover, alkali medication should b... administered.

Cystinuria.—Cystinuria is due to a rather rare disease of metab... olism in which cystine, an amino-acid contained in practically al... protein foods, is not oxidized and must, therefore, be excreted i...

ine. Diagnosis is made by finding the characteristic crystals urine sediment. Inasmuch as cystine is readily soluble in aline medium, the obvious therapeutic approach is alkalini- of the urine. Enough medication, such as bicarbonate of must be given so that the urine will give an alkaline reaction nus paper throughout the day. Inasmuch as the formation of e stones in these patients occurs not infrequently, such a lure is of great prophylactic importance. Needless to say, otein intake cannot be eliminated, but it should be reduced to l consistent with basic needs from the standpoint of body rement.

aluria.— Oxaluria indicates the excretion of excess calcium te in the urine; it is recognized by finding the typical crystals of edral or dumb-bell shape in the urine. Their presence in l urinary stones is not infrequent. The source is both endog- s and exogenous, *i. e.*, even when all oxalate-containing foods liminated from the diet, these crystals still persist in the urine their exact source is obscure. Calcium oxalate will precipi- in both acid and alkaline urines and, consequently, alteration e urinary acidity is of no significant help. However, if the enous source of oxalates is removed, the endogenous amount readily be carried by the urine without precipitation. The ry regulation of oxaluria, therefore, consists of omitting all s rich in oxalates and in increasing urinary output. Those s richest in oxalates are:

Beet Tops	Spinach	Black Tea
Swiss Chard	Cocoa	Chocolate
Parsley	Figs	
Rhubarb	Ground Pepper	

ls which contain no oxalic acid are:

Sugars	Peeled Turnips	Radishes
Fats	Sweet Cherries	Peas
Starches	Grapes (Seedless)	Apples
Cauliflower	Grapefruit	Avocados
Water Cress	Lemon and Lime Juice	Green Squash
Cucumbers		Nectarines
Mangoes	Melon	Green Gage Plums

Urinary Calculosis

lthough the last definitive word is yet to be said concerning etiology of stones in the urinary tract, three factors are generally gnized to be of great importance in the formation and growth hese stones: (1) stasis of urine, because of an obstruction to low, fosters precipitation of the urinary salts; (2) urinary ction, especially where the urinary pH is altered (urea-splitting nisms), affects the solubility of the urinary salts and furthers r precipitation; (3) a dietary or metabolic factor which includes mproperly balanced diet and inadequate fluid intake. Thus in prophylaxis or treatment of urinary stones, all three factors

must be considered, and one must: (1) overcome stasis by rem the obstructive lesion if such is present; (2) combat and era the infection; (3) adjust and balance the diet according to the t of calculus present. This dietary therapy is particularly appl where surgical removal of a calculus has been performed and exact chemical composition is known so that specific foods m eliminated and balance made. Where operation has not been p formed, the analysis of the stone may be shrewdly guessed at by radiographic appearance of the calculus and determination of type of crystals found in the urine.

Vitamin deficiencies probably contribute to the formati calculi: the effect of vitamin A on epithelial surfaces is well-kno and an adequate amount must be ingested in order to keep the ur ary mucous membrane in good condition. The incidence of urin stones in such areas as India or China where diet deficiency is wi spread is too well-known to require more than mention. Moreov even in our own country, attention has often been called to t frequent occurrence of urinary stone following peptic ulcer thera and the concomitant dietary restrictions involved.

Composition of Stones.—In order to intelligently treat calcul disease, the various stones must be individualized and approach from the point of view of their composition. The followi classification is widely employed:

- I. Organic stones
  - A. Cystine stones
  - B. Uric acid and urate stones
- II. Primary calcium stones
  - A. Calcium oxalate stones
  - B. Calcium phosphate and calcium carbonate stones

III. Stones containing magnesium. These stones are "mixe and frequently contain calcium, phosphates and oxalates and co tain lesser or greater amounts of ammonium and magnesium salt They are frequently found in the presence of an infection due urea-splitting bacterial organisms.

I. **Organic Stones.**—*A. Cystine stones.* These are treated in th same fashion as the problem of cystinuria (q. v.).

B. *Uric acid and urate stones.* These calculi are generally no radiopaque and present difficulties in diagnosis. Unlike th situation present in gout wherein one finds an excess of uric ac in the blood and little uric acid excretion in the urine, the presen of urate stones is infrequently associated with an elevated blo uric acid level. From the clinical standpoint, urine which strongly acid is an important etiologic consideration in the formati of uric acid stones. Medical (*i.e.* dietary) treatment of these ston consist of:

(1) Low Purin Diet (see Gout) includes elimination of such puri rich foods as liver, kidney, sweetbreads.

(2) Alkalinization of the urine by a combination of an alkali ash diet (*q.v.* below) and by administration of bicarbonate of sod

II. **Primary Calcium Stone.** An excess excretion of calcium the urine no matter how produced will cause the formation of th

f stone in the urinary tract. These causes of hypercalcinuria e such entities as hyperparathyroidism, acidosis, hyper-nosis D, bone rarefaction resultant from prolonged immobili- of the limbs in orthopedic problems. Hyperparathyroidism a frequent cause of calcium stones, having been estimated y from .1 to .5 per cent of all cases of calcium stones in the y tract. This problem must, of course, be considered in the ntial diagnosis of any case of extensive or recurrent urinary us formation.

Calcium Oxalate Stones.—Calculi may be composed partly or y of calcium oxalate. The comments previously made con-g oxaluria are applicable here; where a low-oxalate diet is ited, the endogenous oxalate can be handled readily. How- needless to say, the low-oxalate diet should nevertheless be iate in calories, vitamins, calcium and phosphorus.

ere the stone contains phosphates and carbonates as well as tes, it may be necessary to prescribe a low-oxalate, acid-ash

Calcium Phosphate and Carbonate Stones.—These are by far nost frequent of all calculi found in the urinary tract. Inas-h as phosphates precipitate in an alkaline urine, the formation ones is favored by a persistently alkaline urine, especially when atter is due to infection as by a urea-splitting organism. On foundation, therefore, one can influence stone formation, stone rrence or stone growth by altering the pH of the urine; this is basis for the so-called "acid-ash diet." By ingesting a diet which tend to produce an acid residue, the urine will tend to remain he acid side and thus prevent precipitation of phosphates which ld occur were the urine alkaline.

nis, however, is not always accomplished and frequently the lts are discouraging because of a number of considerations. endence must be placed on the pH value of the bladder urine e, as is well known, the divided kidney urine specimens and the der urine may differ widely in disease. Furthermore, the dis-d kidney may be unable to produce a highly acid urine and the of the acid-ash diet would be impractical. Moreover, a kidney aining a stone may precipitate a different urinary salt with ge in reaction of the urine. Nevertheless, though the acid-ash is no substitute for operation, it may have considerable pallia- effect in non-operative cases.

hen such an acid-ash diet is prescribed, the urine should be kept n optimum pH of 5.2 to 5.4 throughout the day and urinary fiers added if the diet is unable to achieve these levels alone nonium chloride). Although it is quite true that such an acid nen increases the urinary calcium excretion, nevertheless cal- phosphate will not precipitate if the urine is maintained on the side.

ne medical regimen in control of these stones consists of the wing: (1) eliminate infection, particularly if urea-splitting nisms are present (the latter produce an alkaline reaction in the); (2) prescribe an acid-ash diet (see below); (3) add urinary

acidifiers; (4) increase urinary output by increasing fluid in

III. **Stones Containing Magnesium.**—An associated corre between magnesium metabolism and the presence of magne containing calculi has never been established. There is no cli or experimental evidence to indicate any particular factor etiologic in respect to the finding of this mineral. Magnesium ph phate or magnesium-ammonium-phosphate may be found in called "mixed" stones. The principles which apply to the diet management of calcium stones above, apply here as well: eli nation of infection, acid-ash diet, a balanced and adequate inta of both minerals and vitamins.

Acid-Ash Diet (modified from Higgins)

Fundamentally, this diet is so arranged that it offers a high vit min content, an adequate protein and mineral intake and y furnishes an acid residue. The latter may range from 15 to 25 c and thus may be altered to fit the circumstances where a particul urinary pH is arrived at easily or with difficulty. Foods must b salt-free and the total excess base from fruits and vegetables shou not exceed 25 cc. per day.

Foods which are to be used daily:

Meat—beef, chicken, ham (fresh), lamb, liver, heart, kidney, vea fish, oysters and poultry. (Four oz. servings twice a day.)
Eggs—2
Bread—whole wheat, 5 slices
Cereal—any kind, ½ cup
Miscellaneous—spaghetti, macaroni, rice or corn, ½ cup
Milk—1 pint
Cream— ¼ cup
Fruits & Vegetables—choice of 5, ½ cup each (see list - excess bas not to exceed 25 cc.)
Yeast— 2 cakes
Cod Liver Oil— 2 tablespoonfuls, or haliver oil - 2 capsules befor each meal
Wheat Germ—2 tablespoonfuls to be added to cereal

Suggested Plan of Menu	Sample Menu
Breakfast	
Fruit	Orange juice, ½ cup
Cereal & wheat germ	Oatmeal, ½ cup
Eggs	Eggs
Whole wheat bread	Whole wheat bread, 2 slices
Salt-free butter	Butter
Beverage	Coffee or tea
Cream	Cream, ¼ cup
Sugar	Sugar

...TED PLAN OF MENU	SAMPLE MENU
...m	
	Lamb chops, 2 or 3
... or substitute	Steamed rice, ½ cup
...miscellaneous)	
...table or salad	Tomatoes, ½ cup
...le wheat bread	Whole wheat bread, 1½ slices
...free butter	Butter
...t	Baked apple, 1 small
...	Milk, 1 glass
...r	
...t	Roast Beef
... vegetables (cooked	String beans, ½ cup
... raw)	Onions, ½ cup
...ole wheat bread	Whole wheat bread, 1½ slices
...-free butter	Butter
...sert	Tapioca cream pudding
...k	Milk, 1 glass

...SE FRUITS AND VEGETABLES FROM THIS LIST

...Fruit	Amount		cc. of excess basic ash
...termelon	½ cup		2.7
...pes	½ cup		2.7
...rs	½ cup	1 meduim	3.6
...ple	½ cup	1 small	3.7
...pe juice	½ cup		3.9
...non juice	½ cup		4.1
...erry juice	½ cup		4.4
...nge juice	½ cup		4.5
...spberry juice	½ cup		4.9
...ch	½ cup	1 medium	5.0
...non		1 medium	5.5
...nana	½ cup	½ large	5.6
...nge	½ cup	1 medium	5.6
...rries	½ cup		6.1
...ricots	½ cup		6.8
...eapple	½ cup		6.8
...skmelon	½ cup		8.6
...ubarb	½ cup		8.6

...egetable	Amount	cc. of excess basic ash
...paragus	½ cup	0.8
...een peas	½ cup	1.3
...ions	½ cup	1.5
...mpkin	½ cup cooked	1.5
...rnips	½ cup	2.7
...sh	½ cup	2.8
...dishes	½ cup	2.9
...ushrooms	½ cup canned	4.0
...uliflower	½ cup	5.3
...ingbeans	½ cup	5.4
...matoes	½ cup	5.6

Choose Fruits amd Vegetables from this List

Vegetable	Amount	
Cabbage	½ cup (raw 1½ cups)	6
Tomato juice	½ cup	6
Sweet potatoes	½ cup ½ medium	6
White potatoes	½ cup ½ medium	7
Lettuce	¼ head	7
Celery	½ cup	7
Cucumbers	½ cup	7
Rutabaga	½ cup cooked	8
Carrots	½ cup	10
Beets	½ cup	10

Avoid—Very High in Excess Base

Almonds	Dried fruits and vegetables
Molasses	Dandelion greens
Spinach	Parsnips
Beet greens	Figs
Olives	Raisins

In addition, the following Acid and Neutral Foods may be
As Desired:

Acid Foods	Neutral Foods
Cranberries	Sweet butter
Flour	Candy—*no chocolate bars*
Plain cookies	Cornstarch
Pastry with custard or allowed amounts of fruit filling	Lard
	Olive oil
Unsalted peanuts	Salad oil
Unsalted popcorn	Mayonnaise
Unsalted crackers	Sugar
English walnuts	Tapioca
	Coffee
	Coffee (with caffeine removed, *e. g.* Kaffee Hag, Sanka)
	Postum

Alkaline-Ash Diet

In many cases, a diet adequate in vitamins, minerals and prot must be provided with, however, the total alkaline-ash exceed the total acid-ash. From the list of fruits and vegetables giv above, any combination may be selected, but the total excess ba ash should amount to at least 38 cc. daily.

Suggested Plan of Menu	Sample Menu
Breakfast	
Fruit	Orange juice, ½ glass
Cereal	Farina, ⅔ cup, cooked
Egg	1 Egg
Whole wheat toast	1 slice
Butter	1 Pat
Cream	Cream, ⅓ cup
Milk	Milk, 1 glass

STED PLAN OF MENU	SAMPLE MENU
con	
at	Lamb, 1 serving
ato	Baked potato
getable	Celery
ad	Whole wheat toast, ½ slice
tter	Butter
lk	Milk, 1 glass
uit	Canned peaches
r	
at	Roast beef, 1 serving
tato	Sweet potato, 1 serving
getable	Cauliflower, 1 serving
ead	Whole wheat toast, ½ slice
tter	Butter
lk	Milk, 1 glass
ssert	Vanilla ice cream
P. M. Milk	Milk, 1 glass

titutions:

eat—Beef, chicken, cheddar cheese, eggs (2), frankfurters (2), out, ham (fresh), beef heart, lamb chop, lamb roast, beef liver, mackerel, oysters (3 large), pork chop (1), salmon (fresh or ed), trout, turkey (2 slices), veal chop, veal roast, white fish.

ereal—Cornflakes or puffed wheat or puffed rice (1 cup), oat- l or rice (½ cup), farina (⅔ cup), shredded wheat (½ biscuit).

egetables—See listing in Acid-Ash Diet.

addition, the following alkaline and neutral foods may be used esired:

ALKALINE FOODS	NEUTRAL FOODS	
airy products including all cheeses	Sweet butter	Coffee
oups except when made from meat stock	Candy (no chocolate)	Tea
lmonds	Cornstarch	Postum
olasses	Lard	Olive oil
lives	Salad oil	Mayonnaise
	Sugar	Tapioca

he following foods, because of their very high acid-ash content t be omitted:

eat broths	Cranberries
read and crackers except as listed	Peanuts
ll pastries and rich desserts	Walnuts
	Popcorn
	Flour

conclusion, the relationship of diet therapy to calculus disease e urinary tract may be expressed as follows:

) When diet is inadequate (as in avitaminosis A) or unbalanced n excess intake of citrus fruits producing an alkaline urine), e formation may follow.

(2) Dissolution of calculi cannot be accomplished by diet al... but increase of size of these stones may be prevented by diet the... which is directed at the specific stone composition.

(3) The greatest benefit from dietary treatment is in the pr... vention of calculus reformation after operative intervention f... removal.

Urinary Tract Infection

In general, it has been empirically determined that in any ty... of infection of the urinary tract, from the kidney down to th... urethra, there are certain foods which act as irritants to the alread... inflamed urinary tract. In particular, alcohol may stir up a low grade or latent infection and cause an acute flare-up of symptoms; such can happen with overindugence of alcoholic intake in pro... tatitis where at times sufficient prostatic congestion is produced t... cause complete urinary retention. Similarly, symptoms of cystiti... may become extreme following intake of alcohol. Direct rena... irritation by alcohol ingestion has never been definitely proved, bu... it is generally assumed that such renal parenchymal irritation doe... occur.

Condiments, which include bottle sauces, catsup, ginger, horse... radish, mustard, pepper, spices and vinegar have been held sinc... immemorial to produce irritation to the urologic tract. No ex... planation is offered as to the reason for such an action, but any lesion from subacute urethritis to pyelonephritis will show an un... favorable clinical reaction within twenty-four hours after ingestion of these condiments.

Treatment of Renal Infection.—For the most part, chemotherapy and the use of anti-biotics have almost completely replaced dieto... therapy in the treatment of urinary infection. The ketogenic diet, once a stand-by in therapy of pyelonephritis, is of interest for his... torical reasons only. Nevertheless, diet can be useful as an adjuvant in the management of kidney infections.

Treatment of pyelonephritis consists of several approaches: (1) chemo- or antibiotic therapy; (2) correction of all urinary stasis and establishment of proper drainage; (3) increasing the urine out... put by forcing fluids, thus diluting and eliminating bacterial toxins; (4) diet regulation.

The correct choice of urinary antiseptics depends upon the exac... infecting organism and the selection of sulfadiazine or sulfathiazole, penicillin or streptomycin must be determined by the particula... bacteria present and their susceptibility to the various antiseptic... available. When mandelic acid is employed (this drug is especially efficacious in E. coli and streptococcus fecalis infections), the urinary pH should be between 5 and 5.4. This can be achieved by the use o... the acid-ash diet and urinary acidifiers such as ammonium chloride. Conversely, where sulfonamides are employed, the urine should b... kept on the alkaline side because of the greater solubility of these drugs where the pH is 7.0 or above. In such cases, the alkaline-as...

gether with administration of bicarbonate of soda can be of t as adjuvant.

d intake should be maintained between 3,000 and 4,000 cc. in order to insure an adequate urinary output even if it is ary to give such fluids parenterally. This is of primary imnce when sulfonamides are administered in order to prevent itation of crystals in the renal tubules and pelves. In distinct st to this, when mandelic acid is given, in order to achieve a ly acid urine of approximately pH 5.2, fluids must be red to 1000 or 1200 cc. daily; such a condition is of great antage especially when the patient is quite febrile and, therehis drug has fallen into disuse with the introduction of other therapeutic measures now available.

the early stages of acute pyelonephritis, the diet should be osed of liquid or semi-solid food. When the patient has imd somewhat and is better able to tolerate foods, the adjuvant r alkaline-ash diets may be employed as indicated. The acidiet, while producing no bactericidal agents in the urine, aids dering the urine highly acid, thereby inhibiting the growth of bacteria.

VINCENT'S INFECTION

Refer to page 481.

XANTHOMA.

Refer to page 314.

APPENDIX.

APPENDIX.

MARJORIE R. MATTICE, M.S

INTRODUCTION.

[cut]RITIONAL demands of the body vary with age, sex, height and [cut]t and with the sum total of activity during the twenty-four [cut] The variations of age are most significant during the periods [cut]ldhood and youth, and require greater recognition than in the [cut]mature years.

[cut] variations in caloric requirement with change in activity [cut]been elucidated by Sherman. When asleep, the adult needs [cut]Calories per pound per hour. Lying still in bed requires [cut]alories, whereas resting in a sitting position necessitates the [cut]diture of 100 Calories. Five to 15 extra Calories are utilized [cut] standing. Sedentary occupations involve a caloric output of [cut] 0.9 Calories per pound of body weight per hour. The energic [cut]rement for light housework rises to 1.3 Calories per pound or [cut]Calories per hour for a 70-kg. adult. Carpenters, painters, [cut]rtisans average 1.5 Calories per pound. Heavy work or severe [cut]ise entails energy expenditures from 2 to 4 Calories per pound. [cut] use of the following tabulation, the calories per pound per [cut] (estimated from the foregoing from the type of activity [cut]ved) may readily be converted into similar data per kilogram [cut]pounds) or, what is more practicable, into the total calories [cut]ded by a 125-pound (57-kg.) or 154-pound (70-kg.) adult per [cut]:

Cal./lb.	Cal./kg.	Cal./125 lbs.	Cal./70 kg.
0.50	1.10	65	77
0.75	1.66	94	115
1.00	2.20	125	154
1.25	2.75	156	193
1.50	3.30	190	231
1.75	3.85	219	272
2.00	4.40	250	308
2.50	5.50	316	385
3.00	6.60	375	452
3.50	7.70	440	539
4.00	8.80	500	616

TABLE 36.—**Height, Weight and Age.—Boys.**

	Average height, inches.	Average weight, pounds.		Average height, inches.	A[illegible]
Under 1 month .	21 1/8	9 1/8	8 mos., under 9 . .	27 5/8	[illegible]
1 mo., under 2 .	22 1/2	10 3/8	9 mos., under 10 . .	28 1/4	[illegible]
2 mos., under 3 .	23 5/8	12 5/8	10 mos., under 11 . .	28 5/8	[illegible]
3 mos., under 4 .	24 1/2	14 1/8	11 mos., under 12 . .	29	[illegible]
4 mos., under 5 .	25 3/8	15 3/8	1 year	29 1/2	[illegible]
5 mos., under 6 .	26 1/8	16 1/4	2 years	33 5/8	[illegible]
6 mos., under 7 .	26 3/4	17 1/2	3 years	36 5/8	[illegible]
7 mos., under 8 .	27 1/4	18 1/4	4 years	38	34

Height, inches.	5 years.	6 years.	7 years	8 years.	9 years.	10 years.	11 years.	12 years.	13 years.	14 years.
38 . . .	34	34								
39 . . .	35	35								
40 . . .	36	36								
41 . . .	38	38	38							
42 . . .	39	39	39	39						
43 . . .	41	41	41	41						
44 . . .	44	44	44	44						
45 . . .	46	46	46	46	46					
46 . . .	47	48	48	48	48					
47 . . .	49	50	50	50	50	50				
48 . . .	..	52	53	53	53	53				
49 . . .	..	55	55	55	55	55	55			
50 . . .	..	57	58	58	58	58	58	58		
51 . . .	..	..	61	61	61	61	61	61		
52 . . .	..	..	63	64	64	64	64	64	64	
53 . . .	..	..	66	67	67	67	67	68	68	
54 . . .	..	..	..	70	70	70	70	71	71	72
55 . . .	..	..	..	72	72	73	73	74	74	74
56 . . .	..	..	..	75	76	77	77	77	78	78
57 . . .	..	..	..	..	79	80	81	81	82	83
58 . . .	..	..	..	..	83	84	84	85	85	86
59 . . .	..	..	..	..	..	87	88	89	89	90
60 . . .	..	..	..	..	..	91	92	92	93	94
61 . . .	..	..	..	..	..	..	95	96	97	99
62 . . .	..	..	..	..	..	..	100	101	102	103
63 . . .	..	..	..	..	..	..	105	106	107	108
64 . . .	..	..	..	..	..	..	..	109	111	113
65 . . .	..	..	..	..	..	..	..	114	117	119
66 . . .	..	..	..	..	..	..	..	..	119	122
67 . . .	..	..	..	..	..	..	..	..	124	128
68 . . .	..	..	..	..	..	..	..	..	..	134
69 . . .	..	..	..	..	..	..	..	..	..	137
70 . . .	..	..	..	..	..	..	..	..	..	143
71 . . .	..	..	..	..	..	..	..	..	..	148

* As prepared by Bird T. Baldwin and Thomas D. Wood, and accepted by Th[e] American Medical Association.

TABLE 37.—**Height, Weight and Age.—Girls.**

	Average height, inches.	Average weight, pounds.		Average height, inches.	Average weight, pounds.
1 month . .	$20\frac{7}{8}$	$8\frac{5}{8}$	8 mos., under 9 . .	$27\frac{1}{4}$	$17\frac{3}{4}$
under 2 . .	$21\frac{7}{8}$	$10\frac{1}{8}$	9 mos., under 10 . .	$27\frac{5}{8}$	$18\frac{1}{2}$
under 3 .	$23\frac{1}{8}$	$11\frac{3}{4}$	10 mos., under 11 . .	$28\frac{1}{8}$	19
under 4 .	24	13	11 mos., under 12 . .	$28\frac{1}{2}$	$19\frac{1}{2}$
under 5 .	$24\frac{7}{8}$	$14\frac{1}{4}$	1 year	$28\frac{7}{8}$	20
under 6 .	$25\frac{1}{2}$	$15\frac{3}{8}$	2 years	$33\frac{1}{8}$	$25\frac{1}{8}$
, under 7 .	$26\frac{1}{8}$	$16\frac{1}{4}$	3 years	$36\frac{1}{4}$	$29\frac{1}{2}$
, under 8 .	$26\frac{3}{4}$	$17\frac{1}{8}$	4 years	38	33

	5 years.	6 years.	7 years.	8 years.	9 years.	10 years.	11 years.	12 years.	13 years.	14 years.
. .	33	33								
. .	34	34								
. .	36	36	36							
. .	37	37	37							
. .	39	39	39							
. .	41	41	41	41						
. .	42	42	42	42						
. .	45	45	45	45	45					
. .	47	47	47	48	48					
. .	49	50	50	50	50	50				
. .	..	52	52	52	52	53	53			
. .	..	54	54	55	55	56	56			
. .	..	56	56	57	58	59	61	62		
. .	..	..	59	60	61	61	63	65		
. .	..	..	63	64	64	64	65	67		
. .	..	..	66	67	67	68	68	69	71	
. .	..	..	..	69	70	70	71	71	73	
. .	..	..	..	72	74	74	74	75	77	78
. .	..	..	..	..	76	78	78	79	81	83
. .	..	..	..	..	80	82	82	82	84	88
. .	..	..	..	..	..	84	86	86	88	93
. .	..	..	..	..	..	87	90	90	92	96
. .	..	..	..	..	..	91	95	95	97	101
. .	..	..	..	..	..	..	99	100	101	105
. .	..	..	..	..	..	..	104	105	106	109
. .	..	..	..	..	..	..	..	110	110	112
. .	..	..	..	..	..	..	..	114	115	117
. .	..	..	..	..	..	..	..	118	120	121
. .	..	..	..	..	..	..	..	..	124	124
. .	..	..	..	..	..	..	..	..	128	130
. .	..	..	..	..	..	..	..	..	131	133
. .	..	..	..	..	..	..	..	..	..	135
. .	..	..	..	..	..	..	..	..	..	136
. .	..	..	..	..	..	..	..	..	..	138

As prepared by Bird T. Baldwin and Thomas D. Wood, and accepted by The rican Medical Association.

Table 38.—Average Weights of Men With Clothes.

Age.	5′	5′ 1″	5′ 2″	5′ 3″	5′ 4″	5′ 5″	5′ 6″	5′ 7″	5′ 8″	5′ 9″	5′ 10″	5′ 11″	6′	6′ 1″	6′ 2″	6′ 3″	6′ 4″
15	107	109	112	115	118	122	126	130	134	138	142	147	152	157	162	[illegible]	[illegible]
16	109	111	114	117	120	124	128	132	136	140	144	149	154	159	164	[illegible]	[illegible]
17	111	113	116	119	122	126	130	134	138	142	146	151	156	161	166	[illegible]	[illegible]
18	113	115	118	121	124	128	132	136	140	144	148	153	158	163	168	[illegible]	[illegible]
19	115	117	120	123	126	130	134	138	142	146	150	155	160	165	170	[illegible]	[illegible]
20	117	119	122	125	128	132	136	140	144	148	152	156	161	166	171	176	[illegible]
21	118	120	123	126	130	134	138	141	145	149	153	157	162	167	172	177	[illegible]
22	119	121	124	127	131	135	139	142	146	150	154	158	163	168	173	[illegible]	[illegible]
23	120	122	125	128	132	136	140	143	147	151	155	159	164	169	175	[illegible]	[illegible]
24	121	123	126	129	133	137	141	144	148	152	156	160	165	171	177	[illegible]	[illegible]
25	122	124	126	129	133	137	141	145	149	153	157	162	167	173	179	184	[illegible]
26	123	125	127	130	134	138	142	146	150	154	158	163	168	174	180	186	[illegible]
27	124	126	128	131	134	138	142	146	150	154	158	163	169	175	181	187	[illegible]
28	125	127	129	132	135	139	143	147	151	155	159	164	170	176	182	188	[illegible]
29	126	128	130	133	136	140	144	148	152	156	160	165	171	177	183	189	[illegible]
30	126	128	130	133	136	140	144	148	152	156	161	166	172	178	184	190	196
31	127	129	131	134	137	141	145	149	153	157	162	167	173	179	185	191	197
32	127	129	131	134	137	141	145	149	154	158	163	168	174	180	186	192	[illegible]
33	127	129	131	134	137	141	145	149	154	159	164	169	175	181	187	193	[illegible]
34	128	130	132	135	138	142	146	150	155	160	165	170	176	182	188	194	[illegible]
35	128	130	132	135	138	142	146	150	155	160	165	170	176	182	189	195	201
36	129	131	133	136	139	143	147	151	156	161	166	171	177	183	190	196	202
37	129	131	133	136	140	144	148	152	157	162	167	172	178	184	191	197	203
38	130	132	134	137	140	144	148	152	157	162	167	173	179	185	192	198	204
39	130	132	134	137	140	144	148	152	157	162	167	173	179	185	192	199	205
40	131	133	135	138	141	145	149	153	158	163	168	174	180	186	193	200	206
41	131	133	135	138	141	145	149	153	158	163	168	174	180	186	193	200	207
42	132	134	136	139	142	146	150	154	159	164	169	175	181	187	194	201	208
43	132	134	136	139	142	146	150	154	159	164	169	175	181	187	194	201	208
44	133	135	137	140	143	147	151	155	160	165	170	176	182	188	195	202	209
45	135	135	137	140	143	147	151	155	160	165	170	176	182	188	195	202	209
46	134	136	138	141	144	148	152	156	161	166	171	177	183	189	196	203	210
47	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211
48	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211
49	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211
50	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211
51	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212
52	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212
53	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212
54	135	137	139	142	145	149	153	158	163	168	173	178	184	191	198	205	212
55 and over	135	137	139	142	145	149	153	158	163	168	173	178	184	191	198	205	212

Actuarial Society of America, "Medical Impairment Study," 1929.

Note.—Deduct 1 inch for shoes and 8 pounds for clothes to determine nude weigh[illegible]

TABLE 39.—**Average Weights of Women With Clothes.**

	4′ 8″	4′ 9″	4′ 10″	4′ 11″	5′	5′ 1″	5′ 2″	5′ 3″	5′ 4″	5 5″	5′ 6″	5′ 7″	5′ 8″	5 9″	5′ 10″	5′ 11″	6′
.	101	103	105	106	107	109	112	115	118	122	126	130	134	138	142	147	152
.	102	104	106	108	109	111	114	117	120	124	128	132	136	139	143	148	153
.	103	105	107	109	111	113	116	119	122	125	129	133	137	140	144	149	154
.	104	106	108	110	112	114	117	120	123	126	130	134	138	141	145	150	155
.	105	107	109	111	113	115	118	121	124	127	131	135	139	142	145	151	155
.	106	108	110	112	114	116	119	122	125	128	132	136	140	143	147	151	156
.	107	109	111	113	115	117	120	123	126	129	133	137	141	144	148	152	156
.	107	109	111	113	115	117	120	123	126	129	133	137	141	145	149	153	157
.	108	110	112	114	116	118	121	124	127	130	134	138	142	146	150	153	157
.	109	111	113	115	117	119	121	124	127	130	134	138	142	146	150	154	158
. .	109	111	113	115	117	119	121	124	128	131	135	139	143	147	151	154	158
. .	110	112	114	116	118	120	122	125	128	131	135	139	143	147	151	155	159
. .	110	112	114	116	118	120	122	125	129	132	136	140	144	148	152	155	159
. .	111	113	115	117	119	121	123	126	130	133	137	141	145	149	153	156	160
. .	111	113	115	117	119	121	123	126	130	133	137	141	145	149	153	156	160
. .	112	114	116	118	120	122	124	127	131	134	138	142	146	150	154	157	161
. .	113	115	117	119	121	123	125	128	132	135	139	143	147	151	154	157	161
. .	113	115	117	119	121	123	125	128	132	136	140	144	148	152	155	158	162
. .	114	116	118	120	122	124	126	129	133	137	141	145	149	153	156	159	162
. .	115	117	119	121	123	125	127	130	134	138	142	146	150	154	157	160	163
. .	115	117	119	121	123	125	127	130	134	138	142	146	150	154	157	160	163
. .	116	118	120	122	124	126	128	131	135	139	143	147	151	155	158	161	164
. .	116	118	120	122	124	126	129	132	136	140	144	148	152	156	159	162	165
. .	117	119	121	123	125	127	130	133	137	141	145	149	153	157	160	163	166
. .	118	120	122	124	126	128	131	134	138	142	146	150	154	158	161	164	167
. .	119	121	123	125	127	129	132	135	138	142	146	150	154	158	161	164	167
. .	120	122	124	126	128	130	133	136	139	143	147	151	155	159	162	165	168
. .	120	122	124	126	128	130	133	136	139	143	147	151	155	159	162	166	169
. .	121	123	125	127	129	131	134	137	140	144	148	152	156	160	163	167	170
. .	122	124	126	128	130	132	135	138	141	145	149	153	157	161	164	168	171
. .	122	124	126	128	130	132	135	138	141	145	149	153	157	161	164	168	171
. .	123	125	127	129	131	133	136	139	142	146	150	154	158	162	165	169	172
. .	123	125	127	129	131	133	136	139	142	146	151	155	159	163	166	170	173
. .	124	126	128	130	132	134	137	140	143	147	152	156	160	164	167	171	174
. .	124	126	128	130	132	134	137	140	143	147	152	156	161	165	168	172	175
. .	125	127	129	131	133	135	138	141	144	148	152	156	161	165	169	173	176
. .	125	127	129	131	133	135	138	141	144	148	152	157	162	166	170	174	177
.	125	127	129	131	133	135	138	141	144	148	152	157	162	166	170	174	177
.	125	127	129	131	133	135	138	141	144	148	152	157	162	166	170	174	177
.	125	127	129	131	133	135	138	141	144	148	153	158	163	167	171	174	177
er .	125	127	129	131	133	135	138	141	144	148	153	158	163	167	171	174	177

rial Society of America, "Medical Impairment Study," 1929.

. —Deduct 1½ inches for shoes and 4 pounds for clothes to determine nude weight.

WIDTH-WEIGHT TABLES.*

Children 1 to 16 Years—Adults 17 to 24 Years

The publishing of the Width-Weight Tables by H. B. Pr (1936), is felt by the author of this volume to offer the profe one of the most intelligent tables procurable for the establis of a proper concept of *expected* weight.

Quoting from Pryor, "Many investigators have shown, howev that 'normal' weight, as determined by the generally accep standards of average weight for sex, height and age, fails to g adequate information concerning individual nutritional stat . . . Many children and young adults who impress the exa iner as being properly nourished appear considerably underweig or overweight when judged by height-weight-age standards.

"Determination of appropriate body weight as an index of nut tion should take into account not only the factors of sex, heigh and age but also the nature of the bony framework and the bod structure. The individual with large skeletal structure tends be broad and to have heavy muscle tissues (to support the hea frame), while the individual with a small skeleton tends to b slender and to have light muscle structure.

". . . Following a study of various body measurements whic might be used in indices of body build, the bi-iliac diameter o width of the pelvic crest was selected as the most important an least variable measurement of body width. This measurement not variable with posture or respiration, and, since the landmark are definite, it requires no special measuring technique.

"The bi-iliac diameter is best measured from the front wit straight-arm sliding calipers pressed firmly against the widest flar of the iliac crest. This measurement when divided by the standin height times 1000 yields the width-length index which expresse width of the body in percentage of standing height or relative widt

"The relationship between relative width of the body (as meas ured by the width-length index) and body weight was found b mathematical analysis of measurements on 10,000 children an young adults. Data on each person were plotted with unit devia tion from the mean width-length index for age and sex as absciss Correlations between relative width and weight were found to b different for the various age groups. For the age range 17 to 24 year the correlations and standard deviations were as follows:

Men.	*Women.*
$\gamma = +.343 \pm .032$	$\gamma = +.415 \pm .037$
$\sigma_y = 15.392$	$\sigma_y = 16.616$
$\sigma_x = 7.526$	$\sigma_x = 8.213$

* This material has been reprinted with the generous consent of the auth Helen B. Pryor, M.D. and the publisher, Stanford University Press, Stanford Un versity, California.

gression formula $y = \left(\gamma_{x_y} \frac{\sigma_y}{\sigma_x}\right) x$ was applied to express deviation in terms of width deviation. When x = the unit on from mean width-length index for the age-sex group, iation from mean weight in pounds for height and age referred medico-actuarial tables, and γ = the coefficient of correlation n x and y, the values of y are $.70_x$ for men and $.84_x$ for women. r ages 6 to 16 years the regression formula applied to data h age-sex group separately showed the value of y to vary ge. The width-length index becomes relatively less variable red with weight in younger children.

idth-weight tables were constructed from this data in such as to offer a range of seven *normal* weights for each height ge depending upon the width of the iliac crest. In the tables provided, the average width of the iliac crest for each age is shown above the central one of the columns of figures represent average weight for average height. The central n of figures represents the medico-actuarial table of average ts for age and height. Starting from this central column in case, the three columns to the right represent, respectively, and 10 per cent heavier than the central column, while those e left represent, respectively, 5, 7 and 10 per cent lighter than entral column. The bicristal diameters heading the various ns were found by applying the regression formula factors.

or ages 6 to 16 years, the central column represents the Bald-Vood average weights for age and height; and the columns rder from it) on right side represent, respectively, 7, 10, and r cent lighter (left) and 7, 10, and 15 per cent heavier (right) the average. Since there is greater variability in physical urements in the period of rapid growth between 6 and 16 years in the ages either above or below it, a wider range of width is ded in the tables for these years."

is recognized that the mathematics involved in the elaboration bles 40 to 43 is beyond the ready comprehension of the average tionist. This fact, however, need deter none from their use such mathematical knowledge is not required for reading the s. The data herewith presented is so practical as to render it worth the inconvenience of the extra physical measurement. use of these tables, naturally, is denied the average layman. necessitates retention of the older type of table (Tables 36 to 39) eneral purposes. It should be realized, however, that such nts are applicable only to those who approximate the standard ge.

Instructions.

The width of the iliac crest is shown in both inches and ce- meters, since most instruments for measuring width are calibra- in centimeters. For height, inches alone are shown, since heigh- usually measured thereby. Width measurements should be do- next to the skin. This is usually possible without complet- undressing the patient. The weights recorded are without cloth- For school weighing with clothes, allow 1 pound for heights 38 40 inches and 2 pounds for heights above 40 inches.

Children who are extremely tall or extremely short for th- chronological ages should be referred to the tables where th- heights fall in the middle of the range. For example, if a boy, age seven years, is average height for age eleven, he often is found be eleven years broad as well as eleven years tall. His develop- mental age is ahead of his chronological age. Judging an oversize or undersized child by standards for his developmental age do- away with distortion at extremes of height within each age group

To Use Table.

1. Take age of patient at nearest birthday.
2. Take height at nearest inch.
3. Measure with firm pressure the greatest width at the cres of the ilium, or bi-iliac diameter.
4. In the proper age table, opposite the height measuremen and under the bi-iliac diameter measurement, will be foun the appropriate weight in pounds for a patient of this bod build. (If a bi-iliac diameter measurement falls betwee two column headings, it is necessary to interpolate.)

   Example: A boy, aged 6 years, is 45 inches tall. Hi bi-iliac diameter is 16.4 cm. Consequently the appropriat weight for his body build is 40 pounds. Whereas if th same boy had a bi-iliac diameter of 21.6 cm., he shoul weigh 49 pounds.

   Either sliding or spreading calipers may be used t measure the bi-iliac diameter.

Table 40.—WIDTH-WEIGHT FOR BOYS.

Ages: One to Eight Years.

Width of Iliac Crest in Inches and Centimeters

AGE ONE YEAR

4.6	4.8	5.1	5.4	5.6	5.8
11.8	12.2	13.1	14.0	14.4	14.9
16½	17	18	19	19½	20
17½	18	19	20	20½	21
18½	19	20	21	21½	22
19½	20	21	22	22½	23
20½	21	22	23	23½	24
21¼	21¾	23	24¼	24¾	25¼
22	22¾	24	25¼	25¾	26½
24	24¾	26	27¼	27¾	28½

AGE TWO YEARS

Height in inches	4.9 12.5	5.1 13.0	5.3 13.5	5.7 14.5	6.1 15.5	6.3 16.0	6.5 16.5
30	19¾	20¼	20¾	22	23¼	23¾	24¼
31	20¾	21¼	21¾	23	24¼	24¾	25¼
32	22½	23	23¾	25	26¼	26¾	27½
33	23½	24	24¾	26	27¼	27¾	28½
34	24¼	25	25¾	27	28¼	29	29¾
35	26	26¾	27½	29	30½	31¼	32
36	27	27¾	28½	30	31½	32¼	33
37	28¾	29¾	30¼	32	33¾	34½	35¼

AGE THREE YEARS

5.7	5.9	6.3	6.7	6.9	7.2
14.4	14.9	16.0	17.1	17.6	18.2
24	24¾	26	27¼	27¾	28½
25	25¾	27	28¼	29	29¾
26¼	27½	29	30½	31¼	32
28¾	29½	31	32½	33¼	34
29¾	30¼	32	33¾	34½	35¼
30½	31¼	33	34¾	35½	36¼
32¾	33¼	35	36¾	37¾	38½
33½	34¼	36	37¾	38¾	39½

AGE FOUR YEARS

Height in inches	5.8 14.8	6.1 15.5	6.3 16.0	6.75 17.2	7.2 18.4	7.4 18.9	7.7 19.6
35	26	26¾	27½	29	30½	31¼	32
36	28	28¾	29½	31	32½	33¼	34
37	28¾	29¾	30¼	32	33¾	34½	35¼
38	29¾	30½	31¼	33	34¾	35½	36¼
39	31½	32¾	33¼	35	36¾	37¾	38½
40	32½	33½	34¼	36	37¾	38¾	39½
41	34¼	35½	36¼	38	39¾	40¾	41¾
42	35	36	37	39	41	42	43
43	37	38	39	41	43	44	45

AGE FIVE YEARS

6.4	6.6	7.1	7.6	7.8	8.1
16.3	16.8	18.1	19.4	19.9	20.6
29¾	30¼	32	33¾	34½	35¼
31½	32¼	34	35¾	36¾	37½
32¾	33¼	35	36¾	37¾	38½
33½	34¼	36	37¾	38¾	39½
35½	36¼	38	39¾	40¾	41¾
36	37	39	41	42	43
38	39	41	43	44	45
39¾	40¾	43	45¼	46¼	47¼
41½	42¾	45	47½	48¼	49½

AGE SIX YEARS

Height in inches	5.5 13.9	6.1 15.4	6.5 16.4	7.3 18.5	8.1 20.6	8.5 21.6	9.1 23.1
38	26	28	29	32	35	36	38
39	27	29	30	33	36	37	39
40	28	30	31	34	37	38	40
41	30	32	33	36	39	40	42
42	31	33	34	37	40	41	43
43	32	34	36	39	41	44	46
44	35	37	38	42	46	47	49
45	37	39	40	44	48	49	51
46	38	41	42	46	50	51	53
47	40	43	44	48	52	53	56
48	42	44	46	50	54	56	58
49	44	47	49	53	57	59	62
50	46	49	51	55	59	61	63

AGE SEVEN YEARS

6.3	6.7	7.6	8.5	8.9	9.5
16.1	17.1	19.3	21.5	22.5	24.1
32	33	36	39	40	42
33	34	37	40	41	43
34	36	39	41	44	46
37	38	42	46	47	49
39	40	44	48	49	51
41	42	46	50	51	53
43	44	48	52	53	56
45	47	51	55	57	59
47	49	53	57	59	62
50	51	56	61	62	65
52	54	59	64	66	69
54	56	61	66	68	71
57	59	64	69	71	74

AGE EIGHT YEARS

Height in inches	6.0 15.3	6.7 17.0	7.1 18.0	8.0 20.3	8.9 22.6	9.3 23.6	10.0 25.3
42	31	33	34	37	40	41	43
43	32	34	36	39	41	44	46
44	35	37	38	42	46	47	49
45	37	39	40	44	48	49	51
46	38	41	42	46	50	51	53
47	40	43	44	48	52	53	56
48	43	45	47	51	55	57	59
49	44	47	49	53	57	59	62
50	47	50	51	56	61	62	65
51	49	52	54	59	64	66	69
52	52	55	57	62	67	69	72
53	54	58	60	65	70	72	76
54	57	61	63	68	73	75	79
55	59	62	65	70	75	78	81
56	61	65	67	73	79	81	85

WIDTH-WEIGHT FOR BOYS.

Ages: Nine to Fourteen Years.

Width of Iliac Crest in Inches and Centimeters

AGE NINE YEARS

Height in inches	6.5 16.6	7.1 18.1	7.5 19.0	8.3 21.1	9.1 23.2	9.5 24.1	10.1 25.6
45	37	39	40	44	48	49	51
46	38	41	42	46	50	51	53
47	40	43	44	48	52	53	56
48	43	45	47	51	55	57	59
49	44	47	49	53	57	59	62
50	47	50	51	56	61	62	65
51	49	52	54	59	64	66	69
52	52	55	57	62	67	69	72
53	54	58	60	65	70	72	76
54	57	61	63	68	73	75	79
55	59	62	65	70	75	78	81
56	62	66	68	74	80	82	86
57	65	69	71	77	83	85	89
58	68	72	75	81	87	90	94

AGE TEN YEARS

Height in inches	6.7 17.0	7.3 18.5	7.6 19.4	8.5 21.6	9.4 23.8	9.7 24.7
47	40	43	44	48	52	[illegible]
48	43	45	47	51	55	57
49	44	47	49	53	57	[illegible]
50	47	50	51	56	61	[illegible]
51	49	52	54	59	64	[illegible]
52	52	55	57	62	67	[illegible]
53	54	58	60	65	70	72
54	57	61	63	68	73	[illegible]
55	60	63	65	71	77	79
56	63	67	69	75	81	[illegible]
57	66	70	72	78	84	[illegible]
58	69	73	76	82	88	91
59	72	76	78	85	92	94
60	75	79	82	89	96	99

AGE ELEVEN YEARS

Height in inches	7.1 18.1	7.7 19.5	8.0 20.4	8.8 22.3	9.6 24.2	9.9 25.1	10.5 26.5
49	44	47	49	53	57	59	62
50	47	50	51	56	61	62	65
51	49	52	54	59	64	66	69
52	52	55	57	62	67	69	72
53	54	58	60	65	70	72	76
54	57	61	63	68	73	75	79
55	60	63	65	71	77	79	82
56	63	67	69	75	81	83	87
57	66	70	73	79	85	88	92
58	69	73	76	82	88	91	95
59	72	77	79	86	93	95	100
60	76	80	83	90	97	100	104
61	78	83	86	93	100	103	108
62	83	88	91	98	105	108	113
63	87	92	95	103	111	114	119

AGE TWELVE YEARS

Height in inches	7.4 18.8	7.9 20.2	8.3 21.1	9.1 23.1	9.9 25.1	10.3 26.0
50	47	50	51	56	61	62
51	49	52	54	59	64	66
52	52	55	57	62	67	69
53	55	59	61	66	71	73
54	58	61	64	69	74	77
55	60	64	66	72	78	80
56	63	67	69	75	81	83
57	66	70	73	79	85	88
58	70	74	77	83	89	92
59	73	78	80	87	94	96
60	76	80	83	90	97	100
61	79	84	87	94	101	104
62	83	88	92	99	106	110
63	88	93	96	104	112	115
64	90	96	99	107	115	118
65	95	100	104	112	120	124

AGE THIRTEEN YEARS

Height in inches	7.6 19.2	8.2 20.7	8.5 21.6	9.3 23.6	10.1 25.6	10.4 26.5	11.0 28.0
52	52	55	57	62	67	69	72
53	55	59	61	66	71	73	77
54	58	61	64	69	74	77	80
55	60	64	66	72	78	80	84
56	64	68	70	76	82	84	88
57	67	71	74	80	86	89	93
58	70	74	77	83	89	92	96
59	73	78	80	87	94	96	101
60	77	81	84	91	98	101	105
61	80	85	88	95	102	105	110
62	84	89	92	100	108	111	116
63	89	94	97	105	113	116	121
64	92	98	101	109	117	120	126
65	97	103	106	115	124	127	133
66	99	105	108	117	126	129	135
67	103	109	113	122	131	135	141

AGE FOURTEEN YEARS

Height in inches	8.0 20.3	8.6 21.8	8.9 22.7	9.8 24.9	10.7 27.1	11.0 28.0
54	59	62	65	70	75	78
55	60	64	66	72	78	80
56	64	68	70	76	82	84
57	68	72	75	81	87	90
58	71	75	78	84	90	93
59	74	79	81	88	95	97
60	77	82	85	92	99	102
61	82	87	90	97	104	107
62	85	90	93	101	109	112
63	89	95	98	106	114	117
64	94	99	103	111	119	123
65	98	104	107	116	125	128
66	101	107	111	120	129	[illegible]
67	106	113	117	126	135	[illegible]
68	111	118	122	132	142	146
69	114	121	125	135	145	149
70	119	126	131	141	151	156
71	123	131	135	146	157	161

WIDTH-WEIGHT FOR BOYS.

Ages: Fifteen and Sixteen Years.

Width of Iliac Crest in Inches and Centimeters

[A]GE FIFTEEN YEARS

8.7 22.2	9.1 23.2	10.0 25.4	10.9 27.6	11.3 28.6	11.8 30.1
70	72	78	84	86	90
72	75	81	87	90	94
76	78	85	92	94	98
79	81	88	95	97	102
83	86	93	100	103	108
88	91	98	105	108	113
91	94	102	110	113	118
97	100	108	116	119	125
101	105	113	121	125	131
106	109	118	127	130	136
110	114	123	132	136	142
115	118	128	138	141	148
118	122	132	142	146	153
123	127	137	147	151	158
127	132	142	152	157	164
133	137	148	159	163	171
135	140	151	162	167	174
139	144	155	166	171	179
142	146	158	170	174	182

AGE SIXTEEN YEARS

Height in inches	8.1 20.6	8.8 22.5	9.3 23.6	10.3 26.2	11.3 28.8	11.8 29.9	12.5 31.1
59	74	79	81	88	95	97	102
60	79	84	87	94	101	104	109
61	85	90	93	101	109	112	117
62	89	94	97	105	113	116	121
63	94	99	103	111	119	123	128
64	97	103	106	115	124	127	133
65	101	107	111	120	129	133	139
66	106	113	117	126	135	139	146
67	111	118	122	132	142	146	153
68	114	121	125	135	145	149	156
69	119	126	131	141	151	156	163
70	121	128	132	143	154	158	165
71	126	133	138	149	160	165	172
72	129	137	142	153	164	169	177
73	134	142	146	158	170	174	182
74	137	145	150	162	174	179	187

TABLE 41.—WIDTH-WEIGHT FOR GIRLS.

Ages: One to Four Years.

Width of Iliac Crest in Inches and Centimeters

AGE ONE YEAR

4.7 12.0	4.9 12.4	5.2 13.3	5.5 14.2	5.7 14.6	5.9 15.1
15½	16	17	18	18½	19
16½	17	18	19	19½	20
17½	18	19	20	20½	21
18½	19	20	21	21½	22
19½	20	21	22	22½	23
20½	21	22	23	23½	24
21¼	21¾	23	24¼	24¾	25¼

AGE TWO YEARS

Height in inches	4.9 12.4	5.1 13.0	5.3 13.4	5.6 14.4	6.0 15.4	6.2 15.8	6.4 16.4
30	19	19½	20	21	22	22½	23
31	20¾	21¼	21¾	23	24¼	24¾	25¼
32	21½	22	22¾	24	25¼	25¾	26½
33	22½	23	23¾	25	26¼	26¾	27½
34	23½	24	24¾	26	27¼	27¾	28½
35	25	25¾	26½	28	29½	30¼	31
36	27	27¾	28½	30	31½	32¼	33
37	28	28¾	29½	31	32½	33¼	34

AGE THREE YEARS

5.6 14.3	5.8 14.8	6.2 15.9	6.6 17.0	6.8 17.5	7.1 18.1
23	23¾	25	26½	26¾	27½
24	24¾	26	27¼	27¾	28½
25	25¾	27	28¼	29	29¾
26¾	27½	29	30½	31¼	32
27¾	28½	30	31½	32¼	33
28¾	29½	31	32½	33¼	34
30½	31½	33	34¾	35½	36¼
31½	32¼	34	35¾	36½	37½
32¾	33¼	35	36¾	37¾	38½

AGE FOUR YEARS

Height in inches	5.9 15.1	6.1 15.6	6.3 16.1	6.8 17.3	7.3 18.5	7.5 19.0	7.7 19.5
35	26	26¾	27½	29	30½	31¼	32
36	27	27¾	28½	30	31½	32¼	33
37	28	28¾	29½	31	32½	33¼	34
38	29¾	30½	31¼	33	34¾	35½	36¼
39	30½	31½	32¼	34	35¾	36½	37½
40	32½	33½	34¼	36	37¾	38¾	39½
41	33¼	34¼	35¼	37	38¾	39¾	40¾
42	35	36	37	39	41	42	43
43	36	37	38	40	42	43	44

WIDTH-WEIGHT FOR GIRLS

Ages: Five to Ten Years

Width of Iliac Crest in Inches and Centimeters

AGE FIVE YEARS

Height in inches	6.0 15.2	6.2 15.8	6.4 16.4	6.9 17.6	7.4 18.8	7.6 19.4	7.8 20.0
36	28	$28\frac{3}{4}$	$29\frac{1}{2}$	31	$32\frac{1}{2}$	$33\frac{1}{4}$	34
37	$28\frac{3}{4}$	$29\frac{3}{4}$	$30\frac{1}{4}$	32	$33\frac{3}{4}$	$34\frac{1}{2}$	$35\frac{1}{4}$
38	$29\frac{3}{4}$	$30\frac{1}{2}$	$31\frac{1}{4}$	33	$34\frac{3}{4}$	$35\frac{1}{2}$	$36\frac{1}{4}$
39	$30\frac{1}{2}$	$31\frac{1}{2}$	$32\frac{1}{4}$	34	$35\frac{3}{4}$	$36\frac{1}{2}$	$37\frac{1}{2}$
40	$32\frac{1}{2}$	$33\frac{1}{2}$	$34\frac{1}{4}$	36	$37\frac{3}{4}$	$38\frac{3}{4}$	$39\frac{1}{2}$
41	$33\frac{1}{4}$	$34\frac{1}{4}$	$35\frac{1}{4}$	37	$38\frac{3}{4}$	$39\frac{3}{4}$	$40\frac{3}{4}$
42	35	36	37	39	41	42	43
43	37	38	39	41	43	44	45
44	$37\frac{3}{4}$	$38\frac{3}{4}$	$39\frac{3}{4}$	42	$44\frac{1}{4}$	$45\frac{1}{2}$	$46\frac{1}{4}$

AGE SIX YEARS

Height in inches	5.5 13.9	6.0 15.3	6.4 16.2	7.2 18.3	8.0 20.4	[illegible]
38	26	27	28	31	34	[illegible]
39	26	28	29	32	35	[illegible]
40	28	30	31	34	37	[illegible]
41	29	31	32	35	38	[illegible]
42	31	33	34	37	40	[illegible]
43	32	34	35	39	41	[illegible]
44	33	35	37	40	43	[illegible]
45	36	38	39	43	47	[illegible]
46	37	40	41	45	49	[illegible]
47	40	43	44	48	52	[illegible]
48	42	44	46	50	54	[illegible]
49	43	46	48	52	56	[illegible]
50	45	48	50	54	58	[illegible]

AGE SEVEN YEARS

Height in inches	5.6 14.3	6.3 15.9	6.6 16.8	7.5 19.0	8.4 21.2	8.7 22.1	9.4 23.7
40	28	30	31	34	37	38	40
41	29	31	32	35	38	39	41
42	31	33	34	37	40	41	43
43	32	34	36	39	41	44	46
44	33	35	37	40	43	45	47
45	36	38	39	43	47	48	50
46	37	40	41	45	49	50	53
47	40	43	44	48	52	53	56
48	42	44	46	50	54	56	58
49	44	46	48	52	56	58	61
50	45	48	50	54	58	60	63
51	48	51	52	57	62	63	66
52	51	54	56	61	66	68	71
53	54	57	59	64	69	71	74

AGE EIGHT YEARS

Height in inches	6.0 15.3	6.7 17.0	7.1 18.0	8.0 20.3	8.9 22.6	9.3 23.6
43	32	34	36	39	42	44
44	33	35	37	40	43	45
45	36	38	39	43	47	48
46	38	41	42	46	50	51
47	40	43	44	48	52	53
48	42	44	46	50	54	56
49	44	47	49	53	57	59
50	47	49	51	55	59	61
51	49	52	53	58	63	64
52	52	55	57	62	67	69
53	54	58	60	65	70	72
54	56	60	62	67	72	74
55	59	62	65	70	75	78

AGE NINE YEARS

Height in inches	6.5 16.6	7.1 18.1	7.5 19.0	8.3 21.1	9.1 23.2	9.5 24.1	10.1 25.6
45	36	38	39	43	47	48	50
46	38	41	42	46	50	51	54
47	40	43	44	48	52	53	56
48	42	44	46	50	54	56	58
49	44	47	49	53	57	59	62
50	47	50	51	56	61	62	65
51	49	52	54	59	64	66	69
52	52	55	57	62	67	69	72
53	54	58	60	65	70	72	76
54	57	61	63	68	73	75	79
55	60	64	66	72	78	80	84
56	62	66	68	74	80	82	86
57	66	70	72	78	84	86	90

AGE TEN YEARS

Height in inches	7.2 18.4	7.7 19.7	8.0 20.4	8.7 22.1	9.4 23.8	9.7 24.5
47	40	43	44	48	52	53
48	43	45	47	51	55	57
49	45	48	50	54	58	60
50	48	51	52	57	62	63
51	49	52	54	59	64	66
52	52	55	57	62	67	69
53	55	59	61	66	71	73
54	57	61	63	68	73	75
55	60	64	66	72	78	80
56	64	68	70	76	82	84
57	67	71	74	80	86	[illegible]
58	69	73	76	82	88	91
59	72	76	78	85	92	94
60	75	79	82	89	96	[illegible]

WIDTH-WEIGHT FOR GIRLS

Ages: Eleven to Sixteen Years

Width of Iliac Crest in Inches and Centimeters

GE ELEVEN YEARS

8.2	8.5	9.1	9.7	10.0	10.5
20.9	21.6	23.1	24.6	25.4	26.7
45	47	51	55	57	59
48	50	54	58	60	63
52	54	59	64	66	69
54	56	61	66	68	71
56	58	63	68	70	73
59	61	66	71	73	77
61	64	69	74	77	80
64	66	72	78	80	84
68	70	76	82	84	88
71	74	80	86	89	93
75	78	84	90	93	97
79	81	88	95	97	102
83	86	93	100	103	108
87	90	97	104	107	112
91	94	102	110	113	118

AGE TWELVE YEARS

Height in inches	8.1	8.5	8.8	9.5	10.2	10.5	10.9
	20.6	21.6	22.3	24.1	25.9	26.6	27.6
50	50	53	55	60	65	67	70
51	53	56	58	63	68	70	73
52	54	58	60	65	70	72	76
53	56	60	62	67	72	74	78
54	58	61	64	69	74	77	80
55	61	65	67	73	79	81	85
56	65	69	71	77	83	85	89
57	67	71	74	80	86	89	93
58	71	75	78	84	90	93	97
59	74	79	81	88	95	97	102
60	78	83	86	93	100	103	108
61	83	88	91	98	105	108	113
62	87	92	95	103	111	114	119
63	91	97	100	108	116	119	125
64	95	100	104	112	120	124	129
65	98	104	107	116	125	128	134

GE THIRTEEN YEARS

8.9	9.2	9.9	10.6	10.9	11.4
22.6	23.3	25.1	26.9	27.6	28.9
61	64	69	74	77	80
63	65	71	77	79	82
67	69	75	81	83	87
70	73	79	85	88	92
73	76	82	88	91	95
77	79	86	93	95	100
80	83	90	97	100	104
85	88	95	102	105	110
88	92	99	106	110	115
93	96	104	112	115	120
97	100	108	116	119	125
101	105	113	121	125	131
106	109	118	127	130	136
109	113	122	131	135	141
113	117	126	135	139	146
115	119	129	139	143	149

AGE FOURTEEN YEARS

Height in inches	8.6	9.1	9.4	10.1	10.8	11.1	11.6
	21.8	23.1	23.9	25.8	27.3	28.1	29.4
55	64	68	70	76	82	84	88
56	68	72	75	81	87	90	94
57	72	77	79	86	93	95	100
58	77	81	84	91	98	101	105
59	79	84	87	94	101	104	109
60	83	88	92	99	106	110	115
61	87	92	95	103	111	114	119
62	90	96	99	107	115	118	124
63	93	98	102	110	118	122	127
64	97	103	106	115	124	127	133
65	100	106	110	119	128	132	138
66	103	109	113	122	131	135	141
67	108	115	118	128	138	141	148
68	111	117	121	131	141	145	151
69	112	119	123	133	143	147	154
70	113	120	124	134	144	148	155
71	115	122	126	136	146	150	157

AGE FIFTEEN YEARS

9.3	9.6	10.3	11.0	11.3	11.8
23.6	24.4	26.2	28.0	28.8	30.0
80	83	90	97	100	104
84	87	94	101	104	109
88	91	98	105	108	113
92	95	103	111	114	119
95	98	106	114	117	123
99	103	111	119	123	128
102	105	114	123	126	132
105	108	117	126	129	135
107	111	120	129	133	139
110	114	123	132	136	142
115	119	129	139	143	149
119	123	133	143	147	154
121	125	135	145	149	156
122	126	136	146	150	157
124	128	138	148	152	159

AGE SIXTEEN YEARS

Height in Inches.	9.0	9.5	9.8	10.5	11.2	11.5	12.0
	22.9	24.1	24.9	26.6	28.4	29.2	30.5
58	83	88	92	99	106	110	115
59	85	90	93	101	109	112	117
60	89	95	98	106	114	117	123
61	93	98	102	110	118	122	127
62	95	101	105	113	121	125	131
63	97	103	106	115	124	127	133
64	100	106	109	118	127	130	136
65	102	108	112	121	130	134	140
66	106	113	117	126	135	139	146
67	111	117	121	131	141	145	151
68	113	120	124	134	144	148	155
69	115	122	126	136	146	150	157
70	117	124	128	138	148	152	159
71	118	125	130	140	150	155	162

Table 42.—WIDTH-WEIGHT FOR MEN

Ages: Seventeen to Twenty-four Years

Width of Iliac Crest in Inches and Centimeters

AGE SEVENTEEN YEARS

Height in inches	9.2 23.4	9.6 24.5	10.0 25.3	10.7 27.2	11.4 29.1	11.8 29.9	12.2 31.0
61	93	97	99	104	109	111	115
62	98	101	103	109	114	116	120
63	102	106	108	114	120	122	126
64	107	111	113	119	125	127	131
65	112	116	119	125	131	134	138
66	117	121	124	130	136	139	143
67	120	125	127	134	141	143	148
68	125	129	132	139	146	149	153
69	129	133	136	143	150	153	157
70	132	137	139	147	155	157	162
71	136	140	143	151	159	162	166
72	139	144	147	155	163	166	171
73	144	149	152	160	188	171	176
74	149	154	157	166	175	178	183

AGE EIGHTEEN YEARS

Height in inches	9.5 24.1	10.0 25.3	10.2 26.0	11.0 28.0	11.8 30.0	[illegible]
62	102	106	108	114	120	[illegible]
63	107	111	113	119	125	[illegible]
64	111	115	118	124	130	[illegible]
65	116	120	122	129	136	[illegible]
66	120	125	127	134	141	[illegible]
67	124	128	131	138	145	[illegible]
68	128	132	135	142	149	[illegible]
69	131	136	139	146	153	[illegible]
70	135	139	142	150	158	[illegible]
71	138	143	146	154	162	[illegible]
72	142	147	150	158	166	[illegible]
73	146	151	154	162	170	[illegible]
74	151	156	159	168	177	[illegible]

AGE: NINETEEN TO TWENTY YEARS

Height in inches	9.6 24.4	10.1 25.6	10.4 26.4	11.2 28.4	12.0 30.4	12.3 31.2	12.8 32.4
63	111	115	118	124	130	133	137
64	115	119	121	128	135	137	141
65	119	123	125	132	139	141	145
66	122	127	129	136	143	145	150
67	126	130	133	140	147	150	154
68	130	135	138	145	152	155	160
69	134	138	141	149	157	160	164
70	138	142	145	153	161	164	168
71	141	146	149	157	165	168	173
72	145	150	153	161	169	172	177
73	148	153	156	165	174	177	182
74	152	157	160	169	178	181	186
75	156	162	166	174	182	186	192

AGE: TWENTY-ONE TO TWENTY-FOUR YEARS

Height in inches	9.8 24.9	10.3 26.2	10.6 27.0	11.4 29.0	12.2 31.0	12.5 31.8
63	114	118	121	127	133	136
64	118	122	124	131	138	140
65	121	125	128	135	142	145
66	125	129	132	139	146	149
67	128	132	135	142	149	152
68	131	136	139	146	153	156
69	135	139	142	150	158	161
70	138	143	146	154	162	165
71	142	147	150	158	166	169
72	146	151	155	163	171	175
73	151	156	159	168	177	180
74	155	160	164	173	182	186
75	160	165	168	178	188	191

Table 43.—WIDTH-WEIGHT FOR WOMEN

Ages: Seventeen to Twenty-four Years

Width of Iliac Crest in Inches and Centimeters

SEVENTEEN YEARS

9.8	10.1	10.8	11.4	11.7	12.0
25.1	25.8	27.4	29.0	29.7	30.7
96	98	103	108	110	113
99	102	107	112	115	118
103	105	111	117	119	122
106	108	114	120	122	126
109	111	117	123	125	129
112	114	120	126	128	132
115	118	124	130	133	137
119	122	128	134	137	141
123	125	132	139	141	145
126	129	136	143	146	150
129	132	139	146	149	153
131	134	141	148	151	155
134	137	144	151	154	159

AGE EIGHTEEN YEARS

Height in inches	9.6 24.4	10.0 25.4	10.2 26.1	10.9 27.7	11.6 29.3	11.8 30.0	12.2 31.0
60	99	102	104	110	116	118	121
61	102	105	107	113	119	121	124
62	104	108	110	116	122	124	128
63	107	111	113	119	125	127	131
64	109	112	115	121	127	129	133
65	112	116	119	125	131	134	137
66	116	120	122	129	136	138	142
67	120	124	126	133	140	142	146
68	123	127	130	137	144	146	151
69	127	131	134	141	148	151	155
70	129	134	137	144	151	154	159
71	132	137	139	147	155	157	162

ETEEN TO TWENTY YEARS

10.0	10.2	11.0	11.8	12.0	12.3
25.6	26.3	28.3	29.7	30.4	31.4
105	107	113	119	121	124
107	109	115	121	123	127
109	111	117	123	125	129
112	115	121	127	129	133
115	118	124	130	133	137
119	121	128	135	137	141
122	124	131	138	140	144
126	129	136	143	146	150
130	133	140	147	150	154
134	137	144	151	154	159
138	140	148	156	158	163
142	144	152	160	162	167

AGE: TWENTY-ONE TO TWENTY-FOUR YEARS

Height in inches	9.8 24.8	10.1 25.8	10.4 26.5	11.1 28.2	11.8 29.9	12.1 30.6	12.4 31.6
60	103	107	109	115	121	123	127
61	105	109	111	117	123	125	129
62	108	112	114	120	126	128	132
63	111	114	117	123	129	132	135
64	114	118	121	127	133	136	140
65	117	121	124	130	136	139	143
66	121	125	128	135	142	145	149
67	125	129	132	139	146	149	153
68	129	133	136	143	150	153	157
69	132	137	139	147	155	157	162
70	136	140	143	151	159	162	166
71	139	144	147	155	163	166	171

ADEQUATE LOW-COST DIETS.

Booher (*Jour. Am. Med. Assn.*, **114**, 548, 1940) presents tab[illegible] data showing the allowance of major food groups which will pr[illegible] the nutritive essentials for persons at different age levels for a per[illegible] of one year at a relatively low cost. Assuming the family to con[illegible] of "one moderately active man, one moderately active woman, [illegible] five-year-old daughter and an eight-year-old son, this family's fo[illegible] requirements could be adequately met by weekly supplies of th[illegible] kinds and quantities of foods (shown separately for each member [illegible] the family) indicated in Table 44. These weekly allowances [illegible] food provide for the approximate daily intake of calories, prote[illegible] fat and carbohydrate as well as certain minerals and vitamins i[illegible] the quantities shown in Table 45.

TABLE 44.—**A Good Low-Cost Diet: Approximate Quantities Neede[illegible] for One Week for Specified Individuals.***

	Unit of measure.	Moderately active man, quantity.	Moderately active woman, quantity.	Boy 8 years, quantity.	Girl 5 years, quantity.
Flour, cereal†	Pound	4½	3½	2¾	2
Milk (or its equivalent)	Quart	3½	3½	5	7
Potatoes, sweet potatoes	Pound	3	2¾	2¼	2
Dried legumes, nuts	Ounce	6	4	3	2
Tomatoes, citrus fruits	Pound	1¼	1¼	1¼	1¼
Leafy, green and yellow vegetables	Pound	3	3½	3½	2[illegible]
Dried fruits	Pound	¼	¼	⅛	[illegible]
Other vegetables and fruits	Pound	2	1¾	1¼	[illegible]
Butter	Ounce	6	6	6	4
Other fats	Ounce	10	6	1	[illegible]
Sugars	Pound	1¼	1	½	[illegible]
Lean meat, poultry, fish	Pound	2½	1¾	1¼	[illegible]
Eggs	Number	3	4	5	5

* Based on the Yearbook of Agriculture, 1939, page 338.
† Count as 1 pound of flour each 1⅓ pounds of bread purchased.

TABLE 45.—**A Good Low-Cost Diet: Approximate Nutritive Values Dail[illegible] for Specified Individuals.***

	Unit of measure.	Moderately active man.	Moderately active woman.	Boy, 8 years.	Girl 5 years.
Food energy value	Calories	3070	2510	2130	1750
Protein	Grams	95	78	76	66
Fats	Grams	117	94	82	68
Carbohydrates	Grams	409	338	271	214
Calcium	Grams	0.92	0.88	1.10	1.[illegible]
Phosphorus	Grams	1.54	1.33	1.42	1.[illegible]
Iron	Milligrams	15.4	19.3	12.3	9.4
Vitamin A	Int. units†	9000	9600	9500	[illegible]
Vitamin B_1	Int. units†	610	530	500	[illegible]
Ascorbic acid	Milligrams	80	80	70	[illegible]
Riboflavin	Sherman units	720	660	730	[illegible]

* Adapted from Yearbook of Agriculture, 1939, page 338.
† International units.

Family members, description	Milk (quarts)	Potatoes, sweet potatoes (pounds)	toes, citrus fruits (pounds)	yellow vegetables (pounds)	dry legumes, nuts (pounds)	vegetables fruits (pounds)	Eggs (dozen)	poultry, fish (pounds)	Flour, cereals (pounds)	Butter (pounds)	Other fats (pounds)	Sugars (pounds)
Children under 2 years	260	80	65	80	..	...	18	...	50	7	..	3
Children 2 to 3 years	365	90	65	130	..	40	22	15	80	10	..	7
Boys:												
4 to 6 years	365	100	65	130	7	75	22	25	100	15	..	15
7 to 8 years	260–365	120	65	180	10	100	22	65	140	20	3	25
9 to 10 years	260–365	130	65	200	10	140	18	80	160	20	20	40
11 to 12 years	260–365	140	65	200	15	140	18	90	180	20	20	40
13 to 15 years	260–365	160	65	160	15	175	18	100	230	20	30	50
16 to 19 years	260–365	220	65	160	15	175	13	140	310	20	40	65
Girls:												
4 to 7 years	365	100	65	130	7	75	22	25	100	15	..	15
8 to 10 years	260–365	120	65	180	10	100	22	65	140	20	3	25
11 to 13 years	260–365	130	65	200	10	140	18	80	160	20	20	40
14 to 19 years	260–365	140	65	200	15	140	18	90	180	20	20	40
Men 20 years and over:												
Very active	180	300	65	160	25	175	13	160	420	20	60	80
Moderately active	180	160	65	160	20	175	13	130	230	20	30	65
Sedentary	260	140	65	180	10	140	18	90	160	20	20	40
Women 20 years and over:												
Very active	180	160	65	180	15	175	18	100	230	20	30	65
Moderately active	180	140	65	180	15	165	18	90	180	20	20	50
Sedentary	260	100	65	180	10	140	18	90	120	20	20	40
In pregnancy	365	140	65	250	10	200	22	90	170	20	20	40
In lactation	365	170	65	250	10	200	22	100	210	20	30	50
Yearly total for family	...	...	..	...	..	...	..	...	...	..	..	..
Monthly total (divide by 12)	...	...	..	...	..	...	..	...	...	..	..	..
Weekly total (divide by 50)	...	...	..	...	..	...	..	...	.	.	..	..

*From the 1939 Yearbook of Agriculture (Food and Life).

RECOMMENDED DIETARY ALLOWANCES, REVISED 1948
(AMOUNTS PER DAY)
Food and Nutrition Board, National Research Council

	Calories[1]	Protein grams	Calcium grams	Iron mg.	Vitamin A I. U.[2]	Thiamine mg.[3]	Riboflavin mg.[3]	Niacin (Nicotinic acid) mg.[3]	Ascorbic acid mg.	Vitamin D I. U.
Man (154 lb., 70 kg.)										
Sedentary	2400	70	1.0	12[4]	5000	1.2	1.8	12	75	[5]
Physically active	3000	70	1.0	12[4]	5000	1.5	1.8	15	75	[5]
with heavy work	4500	70	1.0	12[4]	5000	1.8	1.8	18	75	[5]
Woman (123 lb., 56 kg.)										
Sedentary	2000	60	1.0	12	5000	1.1	1.5	10	70	[5]
Moderately active	2400	60	1.0	12	5000	1.2	1.5	12	70	[5]
Very active	3000	60	1.0	12	5000	1.5	1.5	15	70	[5]
Pregnancy (latter half)	2400[6]	85	1.5	15	6000	1.5	2.5	15	100	400
Lactation	3000	100	2.0	15	8000	1.5	3.0	15	150	400
Children up to 12 yrs.[7]										
Under 1 yr.[8]	110/2.2 lb. (1 kg.)	3.5/2.2 lb. (1 kg.)	1.0	6	1500	0.4	0.6	4	30	400
1–3 yrs. (27 lb., 12 kg.)	1200	40	1.0	7	2000	0.6	0.9	6	35	400
4–6 yrs. (42 lb., 19 kg.)	1600	50	1.0	8	2500	0.8	1.2	8	50	400
7–9 yrs. (58 lb., 26 kg.)	2000	60	1.0	10	3500	1.0	1.5	10	60	400
10–12 yrs. (78 lb., 35 kg.)	2500	70	1.2	12	4500	1.2	1.8	12	75	400
Children over 12 yrs.[7]										
Girls, 13–15 yrs. (108 lb., 49 kg.)	2600	80	1.3	15	5000	1.3	2.0	13	80	400
16–20 yrs. (122 lb., 55 kg.)	2400	75	1.0	15	5000	1.2	1.8	12	80	400
Boys, 13–15 yrs. (108 lb., 49 kg.)	3200	85	1.4	15	5000	1.5	2.0	15	90	400
16–20 yrs. (141 lb., 64 kg.)	3800	100	1.4	15	6000	1.7	2.5	[illegible]	100	[illegible]

known.
[3]Calorie allowances must be adjusted up or down to meet specific needs. The
calorie values in the table are therefore not applicable to all individuals but rather
represent group averages. The proper calorie allowance is that which over an ex-
tended period will maintain body weight or rate of growth at the level most con-
ducive to well being.
[4]The allowance depends on the relative amounts of vitamin A and carotene.
The allowances of the table are based on the premise that approximately two-thirds
of the vitamin A value of the average diet in this country is contributed by carotene
and that carotene has half or less than half the value of vitamin A.
[5]For adults (except pregnant and lactating women) receiving diets supplying
2,000 calories or less, such as reducing diets, the allowances of thiamine, and niacin
may be 1 mg. and 10 mg. respectively. The fact that figures are given for different
calorie levels for thiamine and niacin does not imply that we can estimate the
requirement of these factors within 500 calories, but they are added merely for
simplicity of calculation. In the present revision, riboflavin allowances are based
on body weight rather than calorie levels. Other members of the B complex also
are required, though no values can be given. Foods supplying adequate thiamine,
riboflavin, and niacin will tend to supply sufficient of the remaining B vitamins.
[6]There is evidence that the male adult needs relatively little iron. The need
will usually be provided for if the diet is satisfactory in other respects.
[7]The need for supplemental vitamin D by vigorous adults leading a normal life
seems to be minimum. For persons working at night and for nuns and others whose
habits shield them from the sunlight, as well as for elderly persons, the ingestion of
small amounts of vitamin D is desirable.
[8]During the latter part of pregnancy the calorie allowance should increase approxi-
mately 20 per cent over the preceding level. The value of 2400 calories represents
the allowance for pregnant, sedentary women.
[9]Allowances for children are based on the needs for the middle year in each group
(as 2, 5, 8, etc.) and are for moderate activity and for average weight at the middle
year of the age group.
[10]Needs of infants increase from month to month with size and activity. The
amounts given are for approximately 6 to 8 months. The dietary requirements for
some of the nutrients such as protein and calcium are less if derived largely from
human milk.

Further recommendations:

Fat. There is available little information concerning the human requirement for
fat. Fat allowances must be based at present more on food habits than on physio-
logical requirements. While a requirement for certain unsaturated fatty acids
(the linoleic and arachidonic acids of natural fats) has been amply demonstrated
with experimental animals, the human need for these fatty acids is not known.
In spite of the paucity of information on this subject there are several factors
which make it desirable (1) that fat be included in the diet to the extent of at least
20 to 25 percent of the total calories and (2) that the fat intake include "essential"
unsaturated fatty acids to the extent of at least 1 percent of the total calories.

fats such as butter, [illegible]
one-half the amounts indicated.

Water.—A suitable allowance of water for adults is 2.5 liters daily in most instances.
An ordinary standard for diverse persons is one milliliter for each calorie of food.
Most of this quantity is contained in prepared foods. At work or in hot weather,
requirements may reach 5 to 13 liters daily. Water should be allowed *ad libitum*,
since sensations of thirst usually serve as adequate guides to intake except for in-
fants and sick persons.

Salt.—The needs for salt and for water are closely interrelated. A liberal allowance
of sodium chloride for the adult is 5 grams daily, except for some persons who sweat
profusely. The average normal intake of salt is 10 to 15 grams daily, an amount
which meets the salt requirements for a water intake up to 4 liters daily. When
sweating is excessive, one additional gram of salt should be consumed for each liter
of water in excess of 4 liters daily. With heavy work or in hot climates 20 to 30
grams daily may be consumed with meals and in drinking water. Even then, most
persons do not need more salt than usually occurs in prepared foods. It has been
shown that after acclimatization persons produce sweat that contains only about
0.5 gram to the liter in contrast with a content of 2 to 3 grams for sweat of the un-
acclimatized person. Consequently after acclimatization, need for increase of salt
beyond that of ordinary food disappears.

Iodine.—The requirement for iodine is small, probably about 0.002 to 0.004 mg.
daily for each kilogram of body weight, or a total of 0.15 to 0.30 mg. daily for the
adult. This need is met by the regular use of iodized salt; its use is especially im-
portant in *adolescence* and *pregnancy*.

Phosphorus.—Available evidence indicates that the phosphorus allowances should
be at least equal to those of calcium in the diets of children and of women during
the latter part of pregnancy and during lactation. In the case of other adults the
phosphorus allowances should be approximately 1.5 times those for calcium. In
general it is safe to assume that if the calcium and protein needs are met through
common foods, the phosphorus requirement also will be covered, because the com-
mon foods richest in calcium and protein are also the best sources of phosphorus.

Copper.—The requirement for copper for adults is about 1 to 2 mg. daily. Infants
and children require approximately 0.05 mg. for each kilogram of body weight.
The requirement for copper is approximately one-tenth that for iron. A good diet
normally will supply sufficient copper.

Vitamin K.—The requirement for vitamin K usually is satisfied by any good diet,
except for the infant *in utero* and for the first few days after birth. Supplemental
vitamin K is recommended during the last month of pregnancy. When it has not
been given in this manner, it is recommended for the mother preceding delivery or
for the baby immediately after birth.

Folic Acid.—Evidence for recognizing folic acid (pteroylglutamic acid, Vitamin
Bc, L. casei factor or vitamin M) as an essential human nutrient is currently be-
ing considered. The quantitative requirement cannot be closely estimated from
evidence now available

UTRITIVE AND CALORIC VALUES OF FOODS.

nce should be made to Classification and Structure of age 101) and Practical Evaluation of Foods (page 160) for prehension of the succeeding tables.

Arrangement of Tabulated Data.

itage values are not readily compared. A quick survey of will enable the clinician or nutritionist to assign to the a more logical diet. It is irrational to delete items from merely because the percentage composition of fats, for , is high; the size of the portion served may be such as to ie fats negligible.

iousehold measure is necessarily a rough one. The metric ents have been brought to the nearest 5 grams, except he total is less than 15 grams. The composition of this portion is calculated to the nearest first decimal, and the are estimated to the nearest 5 except where this value is ngly low.

scertaining average portions, the judgment of five or more has been considered and the accepted portion weighed. eatest disagreement was encountered with the portions of Finally, the allotment for raw meat (to be eaten cooked) ken at ½ pound, and for cooked meat, at ¼ pound. For ersons these items should be halved.

rnationally distributed commercial brands of food are included tables to increase their value, since the use of these products come so common. This innovation should facilitate the work sicians, dietitians and nurses. With few exceptions the icturers are solely responsible for the analyses.

rever possible, carbohydrate data have been reported in suing tables without fiber or other unassimilable matter. denoted by an asterisk on the percentage figure. Unfortu- this designation in most instances cannot be taken as repre- true availability.

e tables have been arranged to show in plain numerals the age relationship of the various nutritive elements of specific Simultaneously, the number of grams of each element in rage portion, together with the total caloric value of the s indicated in **boldface numerals**.

indling such a mass of figures, many errors are liable to enter ed. It is hoped with the care taken, that the mistakes in , calculating, checking and rechecking have been reduced vanishing point. If and when such errors are detected, the will report them, the author will consider it a great favor.

Bridges' Food Calorie Calculator.

The production of various editions of food tables nece required the authors to make a great number of calculatio establishing gram quantities and Caloric values of the various fo

It was found that, irrespective of the care observed in doing mass of calculating necessary, apparently it was impossible avoid arithmetical errors. The calculations were found to be m complicated when the Caloric values of 4.1, 4.1, 9.3 Calories gram were utilized in place of 4.0, 4.0 and 9.0. To lessen the cha of error the appended key was devised to substitute the proces addition for multiplication.

Table 47 is herewith presented as a simple computing key those called upon to calculate swiftly and accurately grams a Calories of any specific food.

By way of illustrating its application, the following example submitted:

	Size of Portion.		Value of Portion		
	Grams.		Carb.	Prot.	Fat
Lima beans, green, fresh . .	75	½ cup	**16.5**	**5.6**	**0.6**
			22.0	7.5	0.8

The combined carbohydrate and protein gram content is 22.1.

The Caloric value of carbohydrates and proteins is 4.1 Calori per gram. The Caloric value of fat is 9.3 Calories per gram.

In order to determine the Caloric value of 22.1 grams of carbo hydrates and of proteins and 0.6 of fat, additions are made a follows:

Grams from Key.			*Calories from Key.*
20.0 grams, carbohydrate and protein,	at 4.1 Calories per gram	=	82.0
2.0 grams, carbohydrate and protein,	at 4.1 Calories per gram	=	8.2
0.1 grams, carbohydrate and protein,	at 4.1 Calories per gram	=	0.4
22.1 grams			
0.6 gram, fat,	at 9.3 Calories per gram	=	5.6
		Total	96.2

It can readily be seen that this short cut reaches the result mo rapidly and with far less likelihood of error than the orthodo methods. Needless to say the carrying of final Caloric values t decimal places is both needless and ridiculous. For practical pu poses the nearest multiple of 5 is the accepted figure which in th instance is 95.

For the sake of completeness the Caloric Key also carries th alcoholic Caloric equation.

TABLE 47.—Bridges' Caloric Key.

	Gram Units.	Calories C. & P. (4.1)	Calories Fat (9.3)
	10	41	93
	20	82	186
	30	123	279
	40	164	372
	50	205	465
	60	246	558
	70	287	651
	80	328	754
	90	369	837
	100	410	930
	1	4.1	9.3
	2	8.2	18.6
	3	12.3	27.9
	4	16.4	37.2
	5	20.5	46.5
	6	24.6	55.8
	7	28.7	65.1
	8	32.8	75.4
	9	36.9	83.7
	10	41.0	93.0
	0.1	0.41	0.93
	0.2	0.82	1.86
	0.3	1.23	2.79
	0.4	1.64	3.72
	0.5	2.05	4.65
	0.6	2.46	5.58
	0.7	2.87	6.51
	0.8	3.28	7.54
	0.9	3.69	8.37
	1.0	4.10	9.30
07	**0.01**	0.041	0.093
14	**0.02**	0.082	0.186
21	**0.03**	0.123	0.279
28	**0.04**	0.164	0.372
35	**0.05**	0.205	0.465
42	**0.06**	0.246	0.558
49	**0.07**	0.287	0.651
56	**0.08**	0.328	0.754
63	**0.09**	0.369	0.837
70	**0.10**	0.410	0.930

Throughout these tables, reference is constantly made to the term "Calorie." As taught in elementary physics, a calorie is the amount of heat necessary to raise the temperature of 1 cc. of wa 1° C. In food chemistry a different type of heat unit is u called the "large calorie" in contradistinction to the calorie described, which is termed the "small calorie." The "large cal (food calorie) is the amount of heat necessary to raise 1 kg. (100 of water 1° C. Based on this definition, the following heat va have been physiologically determined:

TABLE 48.—**Food Equivalents.**

1 gram carbohydrate	= 4.1 Cal.	1 gram fat	= 9.3 Ca
1 gram protein	= 4.1 Cal.	1 gram alcohol	= 7.0 Ca

TABLE 49.—**Abbreviations.**

Teaspoonful	= t.	Inch	= "
Tablespoonful	= T.	Slice	= sl.
Cup	= c.	Small	= sm.
Average	= av.	Large	= lg.
Diameter	= diam.	Strip	= str.
Square	= sq.	Medium	= med.
Pound	= lb.	Scant	= sc.
As purchased	= A.P.	Edible portion	= E.P.
Commercial	= com.	Concentrated	= Conc.

TABLE 50.—**Conversion Factors.**

1 Teaspoonful	(fluid)	= 5 cc.	1 Teacup	(fluid)	= 140 c
1 Dessertspoonful	(fluid)	= 10 cc.	1 Cup	(fluid)	= 236 c
1 Tablespoonful	(fluid)	= 15 cc.	1 Tumbler	(fluid)	= 236 c
1 Demi-tasse	(fluid)	= 70 cc.	1 Glass	(fluid)	= 236 c

3 Teaspoonfuls	= 1 Tablespoonful	30 Grams*	= 1 Ounce
4 Tablespoonfuls	= ¼ Cup	60 Grams†	= 2 Ounces
8 Tablespoonfuls	= ½ Cup	85 Grams‡	= 3 Ounces
16 Tablespoonfuls	= 1 Cup	115 Grams	= ¼ Pound
1 Cup	= 1 Glass	230 Grams	= ½ Pound
2 Cups	= 1 Pint	460 Grams	= 1 Pound
4 Cups	= 1 Quart	1 Kilogram	= 2.2 Poun

All quantities are calculated as level and unpacked. For viscous substances the weight indicated is that held in the measuring instrume not that delivered by rapid draining.

The cup referred to is the "Standard Measuring Cup."
* Actual value = 28.4 gm. † Actual value = 56.8 gm. ‡ Actual value 85.2 gm.

EXPLANATION OF TABLE.

o the large volume of data collected subsequent to the ion of this work, it has been necessary to delete a num- he commercial infiltrations. The remaining commercial ve been restricted to the more commonplace products.

s have been made to present a table of international char- asmuch as foodstuffs of world-wide origin are available in ban and many rural centers. It is essential that the com- of unusual foods be known so that they may be intelligently l a place in diet therapy.

high incidence of blank spaces under the Carbohydrate con- meats and fish is due to the lack of available data. Carbo- s are usually regarded as being absent in these groups. Gly- which is found in meats and fish, is a wholly assimilable drate and warrants determination and tabulation.

establishment of the household measures was the result of ation of the amounts of the various foods allotted per portion aw and cooked states in diet kitchens and hotels. Wherever s could not be readily agreed upon or where it was imprac- obtain a sample of the food for examination and weight, of portion is presented as 100 grams.

res are given for the edible portion of foods in the **raw** or tate unless otherwise designated.

several varieties of the same food are generally presented in lowing order: *Raw, cooked (home), canned, commercial, dried, spiced, etc.* "**Cooked**" implies boiling.

grams in the household measures and the Calories, with few ions, are entered in multiples of 5 wherever the amounts are han 15.

boldface numerals indicate the number of grams and calories verage portion. The plain numerals indicate the percentage sition thereof. *Italicized* letters indicate trade names.

TABLE 51.—**Nutritive and Caloric Values of Foods.**

A

A Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb.	Prot.	Fat
Abalone	230	½ lb.	**7.6**	**49.9**	**0.2**
			3.3	21.7	0.1
Abalone, canned	100	¾ c.	**3.7**	**21.7**	**0.1**
			3.7	21.7	0.1
Acidophilus milk, com.	240	1 c.	**9.0**	**8.2**	**4.8**
			*3.8	3.4	2.0
Agar-agar	10	1 T.	**—**	**—**	**—**
			*72.7	1.6	0.3
Ale yeast, dried	10	2 t.	**4.8**	**3.9**	**0.1**
			48.4	38.9	1.2
Alewives	230	½ lb.		**44.6**	**11.3**
				19.4	4.9
Alfalfa bread	25	1 sl.	**16.0**	**2.6**	**0.3**
			64.0	10.6	1.3
Algae, Hawaiian:					
Limu eleele	25	2 T.	**—**	**0.7**	**—**
			—	2.8	Trace
Limu lipoa	25	2 T	**—**	**0.4**	**—**
			—	1.6	Trace
Alimentary pastes:					
Alphabets	25	¼ c.	**18.9**	**2.9**	**0.3**
			75.6	11.7	1.0
Macaroni (average)	75	½ c.	**55.6**	**10.1**	**0.7**
			74.1	13.4	0.9
Macaroni, boiled	240	1 c.	**37.9**	**7.2**	**3.6**
			15.8	3.0	1.5
Noodles	60	½ c.	**45.4**	**7.0**	**0.6**
			75.2	11.7	1.0
Spaghetti	100	¾ c.	**75.9**	**12.1**	**0.4**
			75.9	12.1	0.4
Vermicelli	60	½ c.	**43.2**	**6.5**	**1.2**
			72.0	10.9	2.0
All-Bran, Kellogg	3	1 T.	**1.7**	**0.4**	**0.1**
			*58.0	13.8	4.5
Alligator pear, see Avocado.					
Almond butter	15	1 T.	**1.2**	**3.2**	**9.2**
			7.9	22.1	61.5
Almond extract, Burnett, A.P.	5	1 t.	**0**	**0**	**0**
			0	0	0
Almond meal	25	2 T.	**1.8**	**12.6**	**3.9**
			*7.2	50.6	15.6
Almond paste (Marzipan)	10	1 t.	**1.1**	**1.3**	**3.5**
			10.9	13.2	34.5
Almonds	30	20	**1.3**	**6.1**	**16.0**
			*4.3	20.5	53.5
Alphabets	25	¼ c.	**18.9**	**2.9**	**0.3**
			75.6	11.7	1.0
Amaranth, Chinese	100		**4.6**	**3.0**	**0.6**
			4.6	3.0	0.6
American cheese, pale	15	2″ x 1½″ x ½″	Trace	**4.3**	**5.4**
			0.3	28.8	35.9
American cheese, red	15	2″ x 1½″ x ½″	**—**	**4.4**	**5.7**
			—	29.6	38.3

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat [illegible]
Negligible quantity is designated by [illegible]

A

items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
. . . .	15	1	0.2	2.3	0.5	15
			*1.7	15.3	3.6	
e	6	1 t.	0.1	1.2	0.7	12
			*2.5	20.6	12.1	
Lambsquarters,						
. . . .	130	1, 2½" diam.	12.2	0.4	0.5	55
			*9.4	0.3	0.4	
. . . .	130	1, 2½" diam.	13.5	0.4	0.4	60
			*10.4	0.3	0.3	
. . . .	130	1, 2½" diam.	14.6	0.4	0.4	65
			*11.2	0.3	0.3	
hout sugar . .	120	1	12.0	0.4	—	50
			*10.0	0.3	Trace	
nned	120	1	37.0	0.8	0.5	160
			*30.8	0.7	0.4	
ithout sugar . .	135	½ c.	5.9	0.1	—	25
			*4.4	0.1	Trace	
. . . .	60	⅛ lb.	32.4	0.8	0.6	140
			*54.0	1.4	1.0	
. . . .	40	1 heaping T.	19.6	0.2	0.4	85
			48.9	0.4	1.1	
om.	35	1 T.	14.7	0.3	—	60
			42.0	0.7	Trace	
g	100	1	28.1	2.4	9.3	210
			*28.1	2.4	9.3	
alian)	100	⅔ c.	40.8	3.4	—	180
			*40.8	3.4	—	
. . . .	120	½ c.	12.6	0.1	—	50
			*10.5	0.1	—	
. . . .	100	1 sl.	32.6	2.3	8.7	225
			*32.6	2.3	8.7	
. . . .	10	1 T.	8.4	0.2	0.2	35
			84.1	1.5	2.5	
, General Mills slices	85	1 pkg.	76.8	1.3	0.3	315
			90.4	1.5	0.3	
ust mix	255	1 pkg.	118.1	16.6	93.3	1380
			46.3	6.5	36.6	
anned, unsweetened	135	½ c.	10.9	0.3	0.3	50
			*7.9	0.2	0.2	
pack	135	½ c.	16.2	0.3	0.3	70
			*12.0	0.2	0.2	
ened	135	½ c.	23.8	0.3	0.1	100
			*17.6	0.2	0.1	
. . . .	50	2, 1½" diam.	3.3	0.3	—	15
			*6.7	0.6	—	
water pack . . .	120	½ c.	7.7	0.6	0.1	35
			*6.4	0.5	0.1	
juice pack . . .	120	½ c.	11.3	0.6	0.2	50
			*9.4	0.5	0.2	
in syrup . . .	120	½ c.	25.7	0.7	0.1	110
			21.4	0.6	0.1	
. . . .	10	1 half	8.7	—	—	35
			86.5	0.6	0.2	
. . . .	50	10 halves	21.7	2.4	0.5	105
			*43.4	4.7	1.0	
without sugar . .	130	½ c. (10)	23.4	2.6	—	105
			*18.0	2.0	Trace	
n	25	1 T.	13.7	0.2	—	55
			55.0	0.8	Trace	

A

Food items.	Size of portion. Grams.	Household measure.	Value of portion: Carb.	Prot.	Fat
Apricot sauce	130	½ c.	**63.4**	**2.5**	**1.7**
			48.8	1.9	[illegible]
Arrowhead tubers (wappato)	50	1 sm.	**11.1**	**4.2**	**0.6**
			*22.2	8.4	1.2
Arrowroot starch	26	2 T.	**23.6**	**0.1**	—
			*90.6	0.4	0.1
Artichokes:					
Globe or French	50	1, 3″ diam.	**6.0**	**1.5**	**0.2**
			11.9	2.9	0.4
Globe, boiled	100	4 hearts	**2.7**	**1.1**	—
			*2.7	1.1	Trace
French, canned	125	5 hearts, sm.	**5.5**	**1.0**	—
			*4.4	0.8	—
Jerusalem	100	1 lg. tuber	**17.0**	**2.2**	**0.1**
			17.0	2.2	0.1
Jerusalem, boiled	100	1 lg.	**3.2**	**1.6**	—
			*3.2	1.6	Trace
Asparagus, green	75	6, 6″ stalks	**1.9**	**1.7**	**0.2**
			*2.5	2.2	0.2
Cooked	85	6, 3¼″ stalks	**1.2**	**1.8**	**0.3**
			*1.4	2.1	0.3
Canned	85	6, 3¼″ long	**1.9**	**1.3**	**0.1**
			*2.3	1.5	0.1
Canned, com.	100	5 stalks	**2.8**	**1.7**	**0.2**
			2.8	1.7	0.2
Soup, canned, conc.	140	½ c.	**9.8**	**1.8**	**1.7**
			7.0	1.3	1.2
Soup, cream of, com.	240	1 c.	**9.1**	**1.9**	**7.9**
			3.8	0.8	3.3
Asparagus-beans, pods	100	1 c.	**7.8**	**3.4**	**0.3**
			*7.8	3.4	0.3
Asparagus-beans, sprouted seeds	100		**3.3**	**2.4**	**0.4**
			*3.3	2.4	0.4
Aunt Jemima buckwheat, corn and wheat flour, Quaker	100	¾ c.	**69.0**	**11.2**	**2.1**
			69.0	11.2	2.1
Aunt Jemima pancake flour, Quaker	100	¾ c.	**71.6**	**10.4**	**1.5**
			71.6	10.4	1.5
Avocados:					
Calavo strain, see Calavo	85	½ sm.	**5.1**	**1.8**	**17.0**
			6.0	2.1	20.0
Florida	85	½, 3½″ long	**2.8**	**1.4**	**22.4**
			3.3	1.7	26.4
Fuerte, hybrid race	85	½, 3½″ long	**4.3**	**1.5**	**22.4**
			5.1	1.7	26.4
Guatemalan race	85	½, 3½″ long	**4.6**	**1.7**	**14.6**
			5.4	2.0	17.2
Mexican race	50	½ med.	**3.4**	**1.0**	**11.6**
			6.7	2.0	23.2
West Indian race (Alligator pear)	85	½, 3½″ long	**6.6**	**1.1**	**6.6**
			7.8	1.3	7.7

B

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat
Baby Ralston	15	1 T.	**10.7**	**2.2**	**0.3**
			71.6	14.8	2.0
Bacillus acidophilus milk, com.	240	1 c.	**9.0**	**8.2**	**4.8**
			*3.8	3.4	2.0

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat re

Negligible quantity is designated b

B

...d items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
...ed	80	4 str. 8½" long		8.4	51.8	515
				10.5	64.8	
..., pea-mealed, Cana-...	60	⅛ lb.		16.2	2.8	90
				27.1	4.6	
...kfast, broiled crisp	20	4 str. 7" long[1]		7.2	9.1	115
				35.8	45.6	
...ders:						
			—	—	0	—
			34.3	—	0	
			—	—	0	—
			41.2	—	0	
			0	0	0	0
			0	0	0	
			—	—	0	—
			37.2	—	0	
			—	—	0	—
			44.0	0	0	
...oots	100	¾ c.	5.1	2.5	0.3	35
			5.1	2.5	0.3	
...lso see Plantain.						
	125	1, 7" x 1½"	26.2	1.6	0.8	120
			*21.0	1.3	0.6	
...Fla.	125	1 med.	28.0	1.5	0.3	125
			22.4	1.2	0.2	
...ed	140	1	32.0	1.8	1.1	150
			22.7	1.3	0.8	
... pisang flour	100	⅞ c.	72.5	3.5	0.8	320
			72.5	3.5	0.8	
...rain	30	½ c.	23.2	3.7	0.5	115
			77.2	12.4	1.8	
...of	50	⅓ c.	38.0	5.6	0.8	185
			76.1	11.1	1.6	
	30	3 T	23.2	2.6	0.3	110
			77.8	8.5	1.1	
..., boiled	100	½ c.	27.6	2.9	0.6	130
			*27.6	2.9	0.6	
...n's patent	9	1 T.	7.0	0.6	0.1	35
			*78.3	6.3	1.0	
...pearled, Quaker	30	3 T.	23.1	3.1	0.2	110
			77.1	10.5	0.8	
...d flour	130	1 c.	94.6	13.7	2.9	470
			72.8	10.5	2.2	
...e Vinespinach.						
...k	230	½ lb.		47.4	3.9	230
				20.6	1.7	
	230	½ lb.		38.9	1.1	170
				16.9	0.5	
	230	½ lb.		46.0	2.3	210
				20.0	1.0	
...ed	230	½ lb.		44.8	6.4	245
				18.6	2.8	
...med	115	¼ lb.		22.4	5.9	145
				19.5	5.1	
...endive	50	⅛ heart	0.5	0.6	Trace	5
			*0.9	1.1	0.1	

..." strip raw bacon weighs 12–15 g.; cooked crisp, weight is reduced to 5–8 g. ... upon leanness of strip.

B

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat
Bean flour, lima	100	1½ c. sc.	**63.0**	**21.5**	[illegible]
			63.0	21.5	[illegible]
Bean soup, canned, conc.	140	½ c.	**19.6**	**8.5**	**2.5**
			14.0	6.1	[illegible]
Soup, com.	250	1 c.	**25.0**	**13.3**	**10.5**
			10.0	5.3	4.2
Beans:					
Baked, canned	250	1 c.	**41.5**	**14.0**	**2.8**
			16.6	5.6	1.1
Baked, Boston style, com.	250	1 c.	**45.0**	**15.0**	**20.0**
			18.0	6.0	8.0
Baked, pork and tomato sauce, com.	250	1 c.	**50.0**	**18.8**	**5.0**
			20.0	7.5	2.0
Baked, vegetarian, com.	250	1 c.	**50.0**	**17.5**	—
			20.0	7.0	—
Broad, green	75	½ c.	**10.3**	**6.1**	**0.5**
			*13.8	8.1	0.6
Broad, green pods	100		**11.9**	**3.0**	**0.3**
			11.9	3.0	0.3
Broad, cooked	125	½ c.	**8.9**	**5.1**	—
			*7.1	5.1	Trace
Butter	75	¾ c.	**21.8**	**7.1**	**0.5**
			29.1	9.4	0.6
Butter, cooked	100	½ c.	**17.1**	**7.1**	—
			*17.1	7.1	Trace
Carob	10	4″ piece	**6.7**	**0.6**	**0.1**
			67.0	5.7	1.1
Cranberry, young pods	100		**0.6**	**0.4**	0
			0.6	0.4	0
Cranberry, medium pods	100		**1.7**	**1.3**	**0.6**
			1.7	1.3	0.6
Fave	75	¾ c.	**3.1**	**4.0**	—
			4.2	5.4	—
Fave, dried	75	½ c.	**36.1**	**17.7**	**1.9**
			48.2	23.6	2.5
Frigoles, dried	75	½ c.	**48.8**	**16.4**	**1.0**
			65.1	21.9	1.3
Green, canned	100	½ c.	**3.4**	**1.2**	**0.1**
			3.4	1.2	0.1
Haricots, cooked	125	½ c.	**20.7**	**8.2**	—
			*16.6	6.6	Trace
Haricots flageolets, canned	130	½ c.	**14.9**	**5.9**	**0.1**
			*11.5	4.6	0.1
Haricots verts, canned	130	¾ c.	**2.6**	**1.4**	**0.1**
			*2.0	1.1	0.1
Kidney, baked, com.	250	1 c.	**52.5**	**18.8**	**3.8**
			21.0	7.5	1.5
Kidney, canned	250	1 c.	**43.3**	**17.5**	**0.5**
			*17.3	7.0	0.2
Lima, green	75	½ c.	**16.5**	**5.6**	**0.6**
			*22.0	7.5	0.8
Lima, canned	130	½ c.	**19.0**	**5.2**	**0.4**
			14.6	4.0	0.3
Lima, dried	75	½ c.	**49.4**	**13.6**	**0.5**
			65.9	18.1	1.5
Lima, yellow, cooked	125	½ c.	**27.5**	**11.2**	**1.0**
			22.0	9.0	0.8
Mesquite, dried	75	½ c.	**57.8**	**9.2**	**1.9**
			77.1	12.2	2.5

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat ...
Negligible quantity is designated ...

B

…d items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
…d, green seed .	100		**59.9**	**23.3**	**1.0**	**350**
			59.9	23.3	1.0	
…outs	125	1 c.	**4.1**	**3.6**	**0.4**	**35**
			*3.3	2.9	0.3	
…d	75	½ c.	**44.7**	**16.9**	**1.4**	**270**
			59.6	22.5	1.8	
…anned	130	⅔ c.	**6.5**	**1.0**	**0.1**	**30**
			5.0	0.8	0.1	
…nner, green pods .	100		**4.7**	**1.4**	**0.1**	**25**
			*4.7	1.4	0.1	
…nner, cooked . .	130	⅔ c.	**1.2**	**1.0**	**—**	**10**
			*0.9	0.8	Trace	
. . . .	75	¾ c.	**4.7**	**1.8**	**0.2**	**30**
			*6.3	2.4	0.2	
…n	75	½ c.	**9.9**	**10.2**	**4.9**	**130**
			13.2	13.6	6.3	
…n, cooked	125	½ c.	**17.2**	**18.0**	**4.4**	**185**
			13.8	14.4	3.5	
…d	100	½ c.	**33.1**	**30.2**	**15.3**	**48**
			33.1	30.2	15.3	
…uts	65	½ c.	**4.1**	**5.5**	**1.2**	**50**
			6.3	8.5	1.8	
. . . .	75	¾ c.	**5.8**	**1.8**	**0.2**	**35**
			7.7	2.4	0.2	
…ooked	130	⅔ c.	**4.5**	**1.3**	**0.1**	**25**
			3.5	1.0	0.1	
…ooked in much water	130	⅔ c.	**2.5**	**1.0**	**0.1**	**15**
			1.9	0.8	0.1	
…anned	130	⅔ c.	**4.9**	**1.4**	**0.1**	**25**
			3.8	1.1	0.1	
. . . :	75	½ c.	**11.0**	**3.5**	**0.2**	**60**
			14.6	4.7	0.3	
…nned	130	⅔ c.	**3.2**	**1.3**	**0.1**	**20**
			*2.5	1.0	0.1	
…baby foods, see …03, 707.						
. . . .	20	⅓ c.	**2.6**	**4.4**	**11.5**	**135**
			13.2	21.9	57.4	
…n:						
. . . .	230	½ lb.	**2.5**	**22.1**	**21.4**	**300**
			1.1	9.6	9.3	
…medium fat . .	230	½ lb.		**36.3**	**65.6**	**760**
				15.8	28.5	
…average (f′, 9–32) .	230	½ lb.		**43.3**	**35.4**	**505**
				19.2	15.4	
…os, average . . .	230	½ lb.		**36.6**	**64.9**	**755**
				15.9	28.2	
…verage (f′, 30–62) .	230	½ lb.		**33.6**	**92.0**	**995**
				14.6	40.0	
…arter, lean . . .	230	½ lb.		**43.5**	**30.5**	**460**
				18.9	12.2	
…nk, lean . . .	230	½ lb.		**50.6**	**14.0**	**340**
				22.0	6.1	
. . . .	115	¼ lb.	**1.2**	**18.4**	**23.5**	**300**
			1.0	16.0	20.4	
…arter, lean . . .	230	½ lb.		**46.0**	**30.8**	**475**
				20.0	13.4	

…f fat percentage.
…assimilable.
…e indicates lack of data.

‡ Gross fat removed.
Negligible quantity is designated by —.

B

Food items.	Size of portion. Grams.	Household measure.	Value of Carb.	Prot.	Fat
Beef, fresh:					
Hind-shank, lean	230	½ lb.		**50.4**	**12.4**
				21.9	5.4
Hind-shank, fat	230	½ lb.		**46.9**	**43.2**
				20.4	18.8
Kidney	155	½ c. diced	**0.6**	**25.7**	**7.4**
			0.4	16.6	4.8
Liver	230	½ lb.	**5.8**	**46.9**	**12.4**
			2.5	20.4	5.4
Loin, lean	230	½ lb.		**42.8**	**36.8**
				18.6	16.0
Loin, average (*f′*, 16–43)	230	½ lb.		**38.9**	**57.5**
				16.9	25.0
Lungs	115	¼ lb.		**17.8**	**3.5**
				15.5	3.0
Marrow	20	1 T.		**0.4**	**18.6**
				2.2	92.8
Muscle, not trimmed	230	½ lb.	**3.0**	**35.7**	**30.2**
			1.3	19.9	13.1
Muscle, well trimmed	230	½ lb.	**3.1**	**46.4**	**12.9**
			1.4	20.2	5.6
Neck, average (*f′*, 8–35)	230	½ lb.		**46.2**	**38.0**
				20.1	16.5
Plate, lean	230	½ lb.		**35.9**	**43.2**
				15.6	18.8
Plate and brisket, average (*f′*, 21–51)	230	½ lb.		**36.3**	**69.0**
				15.8	30.0
Porterhouse steak	230	½ lb.		**50.4**	**46.9**
				21.9	20.4
Ribs, average (*f′*, 12–44)	230	½ lb.		**40.0**	**52.9**
				17.4	23.0
Rib rolls, lean	230	½ lb.		**46.5**	**24.2**
				20.2	10.5
Round, average (*f′*, 8–24)	230	½ lb.		**44.4**	**29.9**
				19.3	13.0
Rump, average (*f′*, 14–48)	230	½ lb.		**35.7**	**71.3**
				15.5	31.0
Scraped	40	2 T.		**9.2**	**1.0**
				23.0	2.5
Shank, fore, average (*f′*, 6–18)	230	½ lb.		**46.9**	**20.7**
				20.4	9.0
Shank, hind, average (*f′*, 7–23)	230	½ lb		**46.2**	**23.0**
				20.1	10.0
Shoulder and clod	230	½ lb.		**46.0**	**23.7**
				20.0	10.3
Sides, average (*f′*, 13–39)	230	½ lb.		**40.3**	**50.6**
				17.5	22.0
Sirloin steak	230	½ lb.		**43.5**	**42.5**
				18.9	18.5
Suet	10	1 T.		**0.5**	**8.2**
				4.7	81.8
Sweetbreads	115	¼ lb.		**19.3**	**13.9**
				16.8	12.1
Tenderloin	230	½ lb.		**37.3**	**56.1**
				16.2	24.4
Tongue	75	5 med. sl.	**0.8**	**14.6**	**17.7**
			1.1	19.4	29.6

f′, range of fat percentage.
* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat
Negligible quantity is designated by

B

items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
d:						
	115	¼ lb.	**0.5**	**39.2**	**8.6**	**245**
			0.4	34.1	7.5	
	115	¼ lb.	**0.8**	**39.3**	**9.4**	**250**
			0.7	34.2	8.2	
	60	⅛ lb.		**15.8**	**4.1**	**105**
				26.4	6.9	
ised	115	¼ lb.		**26.2**	**33.8**	**420**
				22.8	29.4	
sted	115	¼ lb.		**29.1**	**25.3**	**355**
				25.3	22.0	
cooked	115	¼ lb.		**16.4**	**27.3**	**320**
				14.3	23.8	
roiled	115	¼ lb.		**27.8**	**9.0**	**200**
				24.2	7.9	
ibs, roasted	115	¼ lb.		**30.9**	**6.2**	**185**
				26.9	5.4	
asted, choice grade	115	¼ lb.		**24.7**	**42.7**	**500**
				21.5	37.1	
asted, good grade	115	¼ lb.		**29.1**	**25.3**	**315**
				25.3	22.0	
d	115	¼ lb.		**31.6**	**5.6**	**185**
				27.5	4.9	
, cold	115	¼ lb.		**30.5**	**27.8**	**400**
				26.5	24.2	
of, boiled	115	¼ lb.		**32.2**	**3.6**	**165**
				28.0	3.1	
(bottom), braised	115	¼ lb.		**34.5**	**18.3**	**315**
				30.0	15.9	
(top), roasted, choice e	115	¼ lb.		**32.5**	**19.1**	**310**
				28.3	16.6	
(top), roasted, good e	115	¼ lb.		**35.2**	**10.3**	**240**
				30.6	9.0	
, broiled	115	¼ lb.		**33.9**	**6.9**	**205**
				29.5	5.1	
fried, med. fat	115	¼ lb.		**23.5**	**23.5**	**315**
				20.4	20.4	
grilled	115	¼ lb.		**29.0**	**24.8**	**350**
				25.2	21.6	
, round, broiled	115	¼ lb.		**34.3**	**3.6**	**175**
				29.8	3.1	
, tenderloin, broiled,	115	¼ lb		**27.2**	**14.5**	**250**
				23.9	12.6	
, tenderloin, broiled, done	115	¼ lb.		**32.8**	**10.5**	**230**
				28.5	9.1	
breads, boiled	80	2		**17.8**	**6.9**	**135**
				22 2	8.6	
od, roasted	115	¼ lb.		**28.3**	**30.4**	**400**
				24.6	26.4	
e, boiled, lean	115	¼ lb.		**38.3**	**9.4**	**245**
				33.3	8.2	
e, roast, lean	115	¼ lb.		**30.7**	**17.3**	**285**
				26.7	15.0	
e, roast, med. fat	115	¼ lb.		**27.8**	**27.4**	**370**
				24.2	23.8	
ned:						
, minced	115	¼ lb.	**1.3**	**20.5**	**7.8**	**265**
			1.1	17.8	6.8	

B

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Prot.	Fat
Beef, canned:					
Corned	115	¼ lb.		**30.3**	**21.5**
				26.3	18.7
Kidney, stewed	115	¼ lb.	**2.4**	**21.2**	**5.9**
			2.1	18.4	5.1
Luncheon	115	¼ lb.		**31.7**	**18.3**
				27.6	15.9
Roasted	115	¼ lb.		**30.0**	**17.0**
				25.9	14.8
Sweetbreads	115	¼ lb.		**23.2**	**10.9**
				20.2	9.5
Tongue, ground	115	¼ lb.		**24.6**	**28.9**
				21.4	25.1
Tongue, whole	115	¼ lb		**22.5**	**26.7**
				19.5	23.2
Tripe	115	¼ lb.		**19.3**	**9.8**
				16.8	8.5
Beef, miscellaneous:					
Dried, salted and smoked	60	⅛ lb.	**0.3**	**18.0**	**3.9**
			0.4	30.0	6.5
Dripping	10	1 T.	**0**	**—**	**9.9**
			0	Trace	99.0
Hash, corned, canned	230	½ lb.	**34.9**	**23.0**	**3.9**
			15.2	10.0	1.7
Hash, roast, canned	230	½ lb.	**26.2**	**21.8**	**14.7**
			11.4	9.5	6.4
Juice	120	½ c.		**5.9**	**0.7**
				4.9	0.6
Sausage (beef and pork)	115	¼ lb.		**22.3**	**27.7**
				19.4	24.1
Sausage, fried	60	2 oz.	**9.4**	**8.3**	**11.0**
			*15.7	13.8	18.4
Soup, see Soups, canned.					
Spiced, corned and pickled	115	¼ lb.		**13.8**	**59.1**
				12.0	51.4
Stew	115	¼ lb.	**2.9**	**12.8**	**6.7**
			*2.5	11.1	5.8
Stew, canned	115	¼ lb.	**9.0**	**8.3**	**1.6**
			7.8	7.2	1.4
Tongue, pickled	60	2 oz.		**7.7**	**12.3**
				12.8	20.5
Tripe, corned and pickled	115	¼ lb.	**0.2**	**13.4**	**1.4**
			0.2	11.7	1.2
Beefsteak sauce, com.	5	1 t., sc.	**0.8**	**0.1**	**Trace**
			16.0	2.3	1.2
Beets, common red	100	⅔ c. diced	**8.8**	**1.6**	**0.1**
			*8.8	1.6	0.1
Beets, cooked	100	½ c.	**6.5**	**2.3**	**0.1**
			*6.5	2.3	0.1
Beets, canned	100	½ c.	**11.5**	**1.5**	**0.1**
			11.5	1.5	0.1
Beet greens	100	1 c.	**4.2**	**2.0**	**0.3**
			*4.2	2.0	0.3
Beet greens, cooked	135	½ c.	**4.3**	**3.0**	**—**
			3.2	2.2	—
Bel Paese, Italian cheese	30	1 oz.		**6.4**	**7.0**
				21.3	23.5
"Biotes" (acorns)	100		**48.0**	**8.1**	**37.4**
			48.0	8.1	37.4

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remo
Negligible quantity is designated b

B

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
re Crackers						
	130	1 c.	85.8	10.4	16.2	530
			66.0	8.0	12.5	
nuts	35	6 (whole)	4.1	9.7	19.7	240
			11.7	27.6	56.3	
, see Rice, wild.						
ies	60	½ c.	5.0	0.8	0.6	30
			*8.4	1.3	1.0	
ies, stewed without	120	⅔ c.	4.6	0.8	—	25
			*3.8	0.7	Trace	
ies, canned, see Fruits, .						
y juice	120	½ c.	8.4	0.4	—	35
			7.0	0.3	—	
. . . .	230	½ lb.		43.0	3.0	205
				18.7	1.3	
sify	100		16.3	3.1	0.3	80
			*16.3	3.1	0.3	
nge	50		9.1	1.6	1.8	60
			*18.2	3.2	3.7	
. . . .	115	¼ lb.		22.7	15.6	240
				19.7	13.6	
paste	6	1 t.	0.2	1.2	0.7	12
			*4.0	20.1	12.0	
dding or sausage .	60	2 oz.		8.9	20.7	230
				14.8	34.6	
e	230	½ lb.		43.0	1.2	190
				18.7	0.5	
ies	100	⅔ c.	9.7	0.6	0.6	50
			*9.7	0.6	0.6	
ies, canned, water pack	120	½ c.	10.8	0.5	0.5	50
			9.0	0.4	0.4	
ies, canned, juice pack	120	½ c.	13.2	0.5	0.5	60
			11.0	0.4	0.4	
ies, canned, in syrup .	120	½ c.	31.2	0.5	0.5	135
			26.0	0.4	0.4	
ies, canned, see also , canned.						
y juice	120	½ c.	14.9	0.1	—	60
			*12.4	0.1	—	
. . . .	230	½ lb.		44.7	2.8	210
				19.4	1.2	
rst	60	2 oz.		7.0	13.1	150
				11.7	21.8	
sausage	75	6 sl.	0.2	14.0	13.2	180
			0.3	18.7	17.6	
all meat	75	6 sl.		10.8	13.3	170
				14.4	17.8	
, added cereal . . .	75	6 sl.	2.7	11.1	11.9	165
			3.6	14.8	15.9	
cheese	30	2 T.		2.8	7.3	80
				9.4	24.4	
rrow	20	1 T.	0	0.4	18.6	175
			0	2.2	92.8	
leaves and stems . .	75	1½ c.	0.2	2.1	0.3	12
			*0.3	2.8	0.4	
, beef, canned . .	240	1 c.	0.7	6.2	0.2	30
			0.3	2.6	0.1	

B

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat
Bouillon, beef, cube	3.6	1 cube	**0.2**	**0.4**	**0.1**
			5.8	11.4	1.8
Bouillon, canned, conc.	120	½ c.	**0.1**	**4.7**	—
			0.1	3.9	—
Bouillon, tomato, canned	240	1 c.	**1.0**	**2.6**	**0.7**
			0.4	1.1	0.3
Bovril	7	1 t.	**0.2**	**2.7**	Trace
			3.4	38.8	0.2
Brains, fresh:					
Beef	230	½ lb.	**2.5**	**22.1**	**21.4**
			1.1	9.6	9.3
Horse	230	½ lb.		**28.1**	**29.2**
				12.2	12.6
Lamb	230	½ lb.		**21.8**	**16.8**
				9.5	7.3
Pork	230	½ lb.		**26.9**	**23.7**
				11.7	10.3
Veal	230	½ lb.		**23.8**	**20.7**
				10.6	9.0
Brains, cooked:					
Calf, boiled	115	¼ lb.		**13.8**	**6.7**
				12.0	5.8
Sheep, boiled	115	¼ lb.		**13.5**	**7.7**
				11.7	6.7
Bran Flakes, Kellogg	30	¾ c.	**21.3**	**4.0**	**0.7**
			71.5	13.3	2.3
Bran Flakes, Post	30	¾ c.	**22.4**	**3.6**	**0.5**
			74.6	12.0	1.8
Bran, wheat, Pillsbury	3	1 T.	**1.7**	**0.5**	**0.1**
			57.5	16.5	4.6
Bran, whole, Post	3	1 T.	**2.0**	**0.4**	**0.1**
			66.6	13.9	3.0
Braunschweiger sausage	60	2 oz.	**0**	**9.2**	**14.3**
			0	15.4	23.8
Brazil nuts	30	4 av.	**1.2**	**4.1**	**18.4**
			*4.1	13.8	61.5
Breads:					
Alfalfa	25	1 sl.	**16.0**	**4.9**	**0.3**
			64.0	19.6	1.3
Boston brown	30	1 sm. sl.	**13.0**	**2.0**	**1.0**
			43.3	6.7	3.3
Buns, cinnamon	50	1 med.	**28.0**	**3.9**	**2.7**
			56.0	7.8	5.4
Corn	100	4½" sq.	**43.6**	**6.6**	**7.3**
			43.6	6.6	7.3
Cracked wheat, Ward	25	1 sl.	**11.9**	**2.1**	**0.7**
			47.9	8.6	2.9
Crumbs, white, dried	55	½ c.	**41.8**	**7.2**	**1.1**
			76.0	13.0	2.0
Flatbread	100		**73.6**	**14.9**	**0.5**
			73.6	14.9	0.5
French	20	1 sl.	**10.8**	**1.6**	**0.2**
			53.8	8.1	1.0
Ginger	60	1 sq.	**30.8**	**2.5**	**7.1**
			51.4	4.2	11.9
Gluten wheat	25	1 sl.	**7.2**	**6.2**	**0.9**
			28.9	25.0	3.6
Graham, made with milk	30	1 sl.	**14.1**	**3.0**	**1.2**
			47.0	10.0	4.0

* Largely assimilable.
‡ Gross fat remo
Blank space indicates lack of data.
Negligible quantity is designated by

B

Food items	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot	Fat.	Cal.
, made with water	30	1 sl.	14.7	2.7	0.9	80
			49.0	9.0	3.0	
Rusk	15	1	10.5	1.8	0.7	55
			70.4	12.1	5.1	
	30	1 sl.	5.9	10.0	3.8	100
			19.7	33.6	12.8	
	25	1 cracker	18.6	2.8	1.3	100
			74.2	11.1	5.0	
nickel	25	1 sl.	12.4	1.7	0.3	50
			49.7	6.7	1.2	
	20	1 sl.	10.6	1.8	0.6	55
			53.0	9.0	3.0	
h	40	1	22.3	3.4	1.0	115
			55.7	8.5	2.5	
, enriched	50	1, 4½" x 2½"	27.0	4.1	3.0	155
			54.1	8.2	6.1	
t, unenriched	50	1	28.0	3.9	2.7	155
			56.0	7.8	5.4	
na	50	1	28.3	4.3	1.1	145
			56.5	8.5	2.2	
	25	1 sl.	13.3	2.3	0.2	65
			53.2	9.0	0.6	
ack	30	1 sl.	14.7	2.9	0.2	75
			48.9	9.6	0.6	
ewish	30	1 sl.	15.6	2.7	0.3	80
			52.0	9.1	1.1	
hole	30	1 sl.	11.4	3.6	0.2	65
			34.7	11.9	0.6	
d wheat	25	1 sl.	12.9	3.0	0.1	65
			51.5	11.9	0.3	
	20	1 sl.	11.0	1.7	0.2	50
			55.2	8.4	1.0	
(average)	25	1 sl.	13.1	2.3	0.3	65
			52.6	9.2	1.3	
milk	25	1 sl.	12.4	2.2	0.9	65
			49.8	9.0	3.6	
enriched	25	1 sl.	13.1	2.1	0.5	65
			52.3	8.5	2.0	
wheat	25	1 sl.	12.0	2.4	0.9	65
			48.0	9.5	3.5	
hire pudding	50	1 sq	13.4	3.6	4.7	115
			*26.8	7.2	9.4	
ack	5	1, 3" x 1¼"	3.7	0.5	0.5	20
			73.5	9.8	9.9	
it, Hawaiian	100	½ c.	35.2	0.1	0.2	145
			35.2	0.1	0.2	
ffs, see Crackers, Toast,						
t foods, see Cereals.						
eese	30	⅛" sl. 5# loaf		6.6	9.0	110
				22.0	30.0	
eese, American	20	1½ cu. in.		4.0	5.5	70
				20.3	27.5	
mage de, American	25	1½" x 1" x ¾"	0.4	4.0	5.3	65
			*1.4	15.9	21.0	
mage de, European	25	1½" x 1" x ¾"		5.2	5.6	75
				20.9	22.4	
abbit molasses, Gold						
	190	½ c.	140.0	0.9	0	575
			*73.7	0.5	0	

B

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat
Br'er Rabbit molasses, Green Label	190	½ c.	**133.2**	**1.7**	**0**
			*70.1	0.9	0
Brewer's yeast, com.	11	2 t.	**4.3**	**4.2**	**0.2**
			39.0	38.0	2.0
Broad beans, green	75	½ c.	**10.3**	**6.1**	**0.5**
			*13.8	8.1	0.6
Broad beans, green pods	100		**11.9**	**3.0**	**0.3**
			11.9	3.0	0.3
Broad beans, cooked	125	½ c.	**8.9**	**5.1**	**—**
			*7.1	4.1	Trace
Broccoli	120	1 c.	**5.0**	**4.0**	**0.2**
			*4.2	3.3	0.2
Broccoli, cooked	100	½ c.	**0.4**	**3.0**	**0.1**
			*0.4	3.0	0.1
Broilers, see Chicken.					
Broth, see Soups.					
Brussels sprouts	100	1 c.	**7.6**	**4.4**	**0.5**
			7.6	4.4	0.5
Brussels sprouts, cooked	100	½ c.	**1.7**	**2.4**	**—**
			*1.7	2.4	Trace
Brussels sprouts, canned	125	⅔ c.	**3.6**	**1.9**	**0.1**
			*2.9	1.5	0.1
Buckwheat, corn and wheat flour, Aunt Jemima, Quaker	100	¾ c.	**69.8**	**11.2**	**1.9**
			69.8	11.2	1.9
Buckwheat flour (sifted)	115	1 c.	**89.6**	**7.4**	**1.4**
			77.9	6.4	1.2
Buckwheat preparations, self-rising	115	1 c.	**84.4**	**9.4**	**1.4**
			73.4	8.2	1.2
Buffalofish	230	½ lb.		**41.5**	**5.4**
				18.0	2.3
Bullheads	230	½ lb.		**33.1**	**47.2**
				14.4	20.6
Burdock leaves	100		**7.4**	**4.5**	**0.1**
			7.4	4.5	0.1
Burdock root	100		**21.1**	**3.0**	**0.1**
			*21.1	3.0	0.1
Burnett extracts, A.P.: †					
Almond (35%)	5	1 t.	**0**	**0**	**0**
			0	0	0
Celery (65%)	5	1 t.	**0**	**0**	**0**
			0	0	0
Cherry (18%)	5	1 t.	**0**	**0**	**0**
			0	0	0
Lemon (80%)	5	1 t.	**0**	**0**	**0**
			0	0	0
Maple, imitation (24%)	6	1 t.	**1.8**	**0**	**0**
			30.0	0	0
Mint (85%)	5	1 t.	**0**	**0**	**0**
			0	0	0
Onion, imitation (48%)	5	1 t.	**0**	**0**	**0**
			0	0	0
Orange (82%)	5	1 t.	**0**	**0**	**0**
			0	0	0

† Alcohol percentage by volume; calories not computed since there is a variable of alcohol through volatilization during cooking of foods.

* Largely assimilable.

‡ Gross fat remo

Blank space indicates lack of data.

Negligible quantity is designated by

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
tracts, A.P.: †						**B**
le (20%)	6	1 t.	**2.8** 47.0	**0**	**0**	**12**
lio, imitation (65%)	5	1 t.	**0** 0	**0** 0	**0** 0	**—**
rry (20%) . . .	6	1 t.	**2.8** 47.0	**0** 0	**0** 0	**12**
4%)	5	1 t.	**0** 0	**0** 0	**0** 0	**0**
erry (20%) . . .	6	1 t.	**2.8** 47.0	**0** 0	**0** 0	**12**
(35%)	5	1 t.	**0.4** 7.0	**0** 0	**0** 0	**2**
green (65%) . . .	5	1 t.	**0** 0	**0** 0	**0** 0	**0**
. . . .	10	1″ x 1″ x ½″	**—** —	**0.1** 1.0	**8.5** 85.0	**80**
uelted	10	1 T.	**—** —	**0.1** 1.0	**8.5** 85.0	**80**
eans	75	¾ c.	**21.8** 29.1	**7.1** 9.4	**0.5** 0.6	**125**
eans, cooked . . .	100	½ c.	**17.1** *17.1	**7.1** 7.1	**—** Trace	**100**
h	230	½ lb.		**41.4** 18.0	**25.3** 11.0	**405**
ilk, see Milks, cultured.						
uts	20	12	**0.7** 3.5	**5.6** 27.9	**12.2** 61.2	**140**
otch	5	¾″ sq. x ⅜″	**4.1** *82.0	**0** 0	**0.6** 12.0	**20**

C

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
e:						
. . . .	85	½ c.	**3.6** *4.4	**1.2** 1.4	**0.2** 0.2	**20**
g, boiled	130	¾ c.	**1.0** *0.8	**1.4** 1.1	**—** Trace	**10**
r, boiled	130	¾ c.	**1.7** *1.3	**1.0** 0.8	**—** Trace	**11**
se or celery . . .	110	1 c.	**2.6** 2.4	**1.5** 1.4	**0.1** 0.1	**20**
se, cooked . . .	100	⅔ c.	**2.0** 2.0	**1.0** 1.0	**0.1** 0.1	**13**
etto	100	¾ c.	**6.1** 6.1	**3.3** 3.3	**0.6** 0.6	**45**
etto, cooked . . .	100	½ c.	**5.6** 5.6	**2.9** 2.9	**0.5** 0.5	**40**
. . . .	60	½ c.	**1.8** *3.5	**1.1** 1.8	**0.1** 0.2	**15**
. . . .	120	1 c.	**7.2** 6.0	**3.9** 3.3	**0.8** 0.7	**55**
, boiled	100	½ c.	**1.1** *1.1	**1.3** 1.3	**—** Trace	**10**
vallo, Italian cheese .	5	1 t.		**1.7** 34.3	**1.1** 22.0	**15**
. . . .	50	1 sl.	**29.3** *58.7	**4.2** 8.4	**0.1** 0.3	**140**
lation	50	1 sl.	**27.9** 55.9	**2.9** 5.9	**5.9** 11.7	**180**

otnote, page 620

C

Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb	Prot.	Fat
Cakes:					
Foundation, frosted	60	1 sl.	**36.2**	**3.0**	**5.6**
			60.4	5.0	9.3
Fruit, dark	60	1 sl.	**33.5**	**3.1**	**8.3**
			55.9	5.2	13.8
Fruit, dark, com.	60	1 sl.	**37.8**	**2.9**	**8.3**
			63.0	4.8	13.8
Fruit, light, com.	60	1 sl.	**39.0**	**2.6**	**7.5**
			65.0	4.4	12.5
Jelly roll	50	1 sl.	**27.7**	**2.4**	**9.5**
			*55.4	4.8	19.0
Plain	50	1 sl.	**28.5**	**3.2**	**4.1**
			57.0	6.4	8.2
Plain, frosted	60	1 sl.	**37.3**	**3.1**	**3.7**
			62.1	5.2	6.2
Pound	50	1 sl.	**24.7**	**3.6**	**11.7**
			49.3	7.1	23.5
Rich	50	1 sl.	**27.1**	**2.5**	**8.9**
			54.2	5.0	17.7
Rich, frosted	50	1 sl.	**29.1**	**2.2**	**7.3**
			58.2	4.4	14.7
Scones (with egg)	100	1	**59.5**	**9.2**	**10.5**
			*59.5	9.2	10.5
Scones (without egg)	100	1	**57.1**	**8.4**	**13.2**
			*57.1	8.4	13.2
Shortbread	25	1 sq.	**16.4**	**1.4**	**5.7**
			65.6	5.8	23.0
Sponge	50	1 sq.	**26.7**	**4.7**	**3.5**
			53.5	9.5	7.0
Calavos (Avocado)	14	1 T.	**0.8**	**0.3**	**2.8**
			6.0	2.1	20.0
Small	85	½	**5.1**	**1.8**	**17.0**
			6.0	2.1	20.0
Diced	150	1 c.	**9.0**	**3.2**	**30.0**
			6.0	2.1	20.0
Pulp	230	1 c.	**13.7**	**4.8**	**46.0**
			6.0	2.1	20.0
Sieved pulp	230	1 c.	**10.1**	**4.8**	**46.0**
			4.4	2.1	20.0
Calf's foot jelly	45	2 T.	**7.8**	**1.9**	**—**
			17.4	4.3	—
Calves' liver, see Veal					
Camembert cheese, European	40	1 triangle		**9.0**	**10.5**
				22.2	26.3
Campbell's strained baby soups, see page 703.					
Canada Dry ginger ale	225	1 c.	**20.3**		
			9.0		
Candy:					
Butterscotch	5	¾" sq. x ⅜"	**4.1**	**0**	**0.6**
			*82.0	0	12.0
Caramels	10	⅞" sq. x ½"	**7.8**	**0.2**	**1.2**
			*78.0	2.0	12.0
Chocolate, bitter	6	¾" x 1½" x ¼"	**1.1**	**0.3**	**3.2**
			18.0	5.5	52.9
Chocolate, sweetened, plain	6	¾" x 1½" x ¼"	**3.6**	**0.1**	**1.8**
			60.0	2.0	29.8
Chocolate, sweetened, milk	6	¾" x 1½" x ¼"	**3.2**	**0.4**	**2.0**
			54.0	6.0	33.5

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat rema…
Negligible quantity is designated by …

C

Food items.	Size of portion. Grams.	Household measure	Value of portion. Carb.	Prot.	Fat	Cal.
te, sweetened, milk, lmonds	6	¾″ x 1½″ x ¼″	**3.1**	**0.5**	**2.3**	35
			51.0	8.0	38.6	
te creams	14	1¼″ diam. x ¾″	**10.1**	**0.6**	**2.0**	60
			72.0	4.0	14.0	
t	8	1″ sq. x ⅝″	**7.3**	**0**	**0**	30
			*91.0	0	0	
plain	45	2″ sq. x ⅝″	**39.6**	**0.9**	**1.8**	185
			88.0	2.0	4.0	
uits:						
ots	20	1 med.	**17.3**	**—**	**—**	70
			86.5	0.6	0.2	
ries	10	3	**5.6**	**—**	**0**	25
			*55.8	0.6	0	
	15	1	**11.0**	**0.5**	**—**	45
			73.7	3.5	0.2	
s	30	1 oz.	**22.8**	**0.4**	**0.2**	95
			75.9	1.3	0.6	
apple	50	1 sl.	**40.0**	**0.4**	**0.2**	165
			80.0	0.8	0.4	
	8	3 balls, ¾″ diam.	**7.9**	**0**	**0**	30
			*99.0	0	0	
mallows	30	5, 1¼″ diam.	**24.0**	**2.0**	**—**	105
			*80.0	6.7	—	
t brittle	15	1½″ x 3″	**10.1**	**1.8**	**2.7**	75
			67.0	12.0	18.0	
, home-made	10	1 sq.	**8.8**	**—**	**0.6**	40
			*87.8	0.2	6.2	
e sugars and syrups.						
upe	100	¼, 5″ diam.	**5.7**	**0.6**	**0.2**	25
			*5.7	0.6	0.2	
	5	1 t.	**0.3**	**0.2**	Trace	2
			5.0	3.2	0.5	
o, Italian sausage	60	2 oz.	**0.8**	**12.5**	**24.1**	245
			1.4	20.8	40.2	
ola juice	225	1 c.	**23.2**	**0.2**	**0.2**	100
			10.3	0.1	0.1	
n milk, evaporated	15	1 T.	**1.5**	**1.0**	**1.2**	20
			*9.9	6.8	7.9	
ean	10	4″ piece	**6.7**	**0.6**	**0.1**	30
			67.0	5.7	1.1	
	230	½ lb.		**43.7**	**2.3**	200
				19.0	1.0	
en moss (Irish)	10	1 T.	**—**	**0.7**	**—**	3
			0.4	6.8	—	
juice, Cellu	120	½ c.	**7.2**	**0.4**	**0.2**	35
			*6.0	0.3	0.2	
tops	100	1 c.	**7.2**	**3.2**		45
			7.2	3.2		
, old, raw	80	½ c. grated	**4.3**	**0.6**	**—**	20
			*5.4	0.7	Trace	
g, boiled	75	½ c.	**3.4**	**0.7**	**—**	15
			*4.5	0.9	Trace	
oiled	75	½ c.	**3.2**	**0.4**	**—**	15
			*4.3	0.6	Trace	
ed	100	⅔ c.	**7.6**	**1.0**	**0.3**	40
			7.6	1.0	0.3	
cated	100		**80.3**	**7.7**	**3.6**	395
			80.3	7.7	3.6	
nut kernels, raw	100		**29.4**	**21.6**	**39.0**	570
			29.4	21.6	39.0	

C

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb	Prot	Fat
Cashew nut kernels, fried in cocoanut oil	15	8	**2.0**	**4.3**	**7.9**
			13.4	28.7	52.4
Cassava:					
Bread	25	1 sl.	**20.0**	**2.3**	**0.1**
			79.0	9.1	0.3
Root	100		**27.1**	**1.6**	**0.2**
			27.1	1.6	0.2
Starch	60	½ c.	**53.3**	**0.3**	**0.1**
			88.8	0.5	0.1
Sweet	100		**28.4**	**1.1**	**0.2**
			*28.4	1.1	0.2
Wafers	25		**20.9**	**0.3**	Trace
			*83.6	1.1	0.2
Catfish	230	½ lb.		**33.1**	**47.2**
				14.4	20.6
Catfish, fried	115	¼ lb.	**7.5**	**21.6**	**12.0**
			*6.5	18.8	10.5
Catfish, steamed	115	¼ lb.		**23.5**	**4.3**
				20.4	3.7
Catjang-peas, green pods	100		**6.6**	**3.3**	**0.4**
			*6.6	3.3	0.4
Catsup, tomato	20	1 T.	**4.8**	**0.4**	**0.2**
			24.0	2.0	1.0
Cauliflower	125	1¼ c.	**3.9**	**2.3**	**0.6**
			*2.8	1.8	0.5
Cauliflower, cooked	100	¾ c.	**1.4**	**1.6**	**0.4**
			*1.4	1.6	0.4
Cauliflower, canned	100	¾ c.	**3.0**	**1.0**	**0.2**
			3.0	1.0	0.2
Caviar, sturgeon, Russian	15	2 t.	**1.1**	**4.5**	**3.0**
			7.6	30.0	19.7
Celeriac, cooked	100	1 med.	**2.0**	**1.5**	**0.2**
			*2.0	1.5	0.2
Celeriac roots	90	1 med.	**7.9**	**1.5**	**0.3**
			8.8	1.7	0.3
Celery:					
Raw	40	2, 7″ stalks	**0.5**	**0.4**	Trace
			*1.3	1.1	0.1
Cooked	100	¾ c.	**0.8**	**0.3**	—
			*0.8	0.3	Trace
Cabbage	110	1 c.	**2.6**	**1.5**	**0.1**
			2.4	1.4	0.1
Cabbage, cooked	100	¾ c.	**2.0**	**1.0**	**0.1**
			2.0	1.0	0.1
Extract, Burnett, A.P.	5	1 t.	**0**	**0**	**0**
			0	0	0
Root (celeriac)	90	1 med.	**7.9**	**1.5**	**0.3**
			8.8	1.7	0.3
Soup, canned	230	1 c.	**11.5**	**4.8**	**6.4**
			5.0	2.1	2.8
Soup, canned, conc.	140	½ c.	**9.5**	**2.0**	**2.2**
			6.8	1.4	1.6
Soup, cream of, canned, com.	230	1 c.	**9.2**	**1.8**	**11.5**
			4.0	0.8	5.0
Cereal coffee infusion	240	1 c.	**3.4**	**0.5**	—
			1.4	0.2	—

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remov
Negligible quantity is designated by

C

ood items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
Eat:						
Bran, Kellogg . .	3	1 T.	1.7	0.4	0.1	9
			*58.0	13.8	4.5	
kes, Kellogg . . .	30	⅔ c.	21.3	4.0	0.7	110
			71.5	13.3	2.3	
kes, Post . . .	30	⅔ c.	22.4	3.6	0.5	110
			74.6	12.0	1.8	
eat, Pillsbury . .	3	1 T.	1.7	0.5	0.1	9
			57.5	16.5	4.6	
ole, Post . . .	3	1 T.	2.0	0.4	0.1	11
			66.6	13.9	3.0	
:						
kes, Kellogg . . .	30	1⅓ c.	26.2	2.2	0.1	115
			87.4	7.4	0.2	
kes, Quaker . . .	30	1⅓ c.	24.9	2.6	0.1	115
			82.9	8.7	0.3	
x, General Mills .	35	1⅓ c.	26.4	2.8	0.9	125
			81.0	8.0	2.5	
st *Toasties* . . .	30	1 c.	25.6	2.8	0.1	115
			85.5	7.1	0.2	
:						
heerios, General Mills	30	1 heaping c.	20.2	4.6	2.1	120
			67.5	15.5	7.0	
:						
lakes, Heinz . . .	30	1 c.	25.0	3.2	0.3	120
			83.2	10.5	0.9	
lakes, White House .	30	1 c.	24.4	2.7	0.6	115
			81.2	8.9	2.0	
rispies, Kellogg . .	30	1 c.	26.5	1.8	0.1	115
			88.4	6.0	0.3	
uffed, Quaker . . .	15	1 c.	13.3	0.9	—	60
			88.8	6.2	0.2	
e:						
laked	30	1 c.	22.7	3.0	0.4	110
			*75.8	10.0	1.4	
eat:						
rackels, Quaker . .	30	1 c.	24.1	3.3	0.1	115
			80.2	10.9	0.4	
lakes, Quaker . . .	30	1 c.	22.7	4.1	0.3	110
			75.6	13.7	1.1	
'Force" Whole wheat flakes, Hecker—H-O	30	1 c.	23.8	3.4	0.3	115
			*79.5	11.4	1.1	
Holland Rusk . . .	15	1	10.5	1.8	0.7	55
			70.4	12.1	5.1	
Krispies, Kellogg . .	30	⅞ c.	24.8	2.7	0.2	115
			83.7	8.9	0.8	
Krumbles, Kellogg . .	30	½ c.	24.6	2.8	0.4	115
			82.0	9.2	1.2	
Muffets, Quaker . .	23	1	17.5	2.6	0.3	85
			75.6	11.1	1.4	
Puffed, Quaker . . .	15	1 c.	11.3	2.3	0.2	55
			75.4	15.6	1.6	
Rippled, Loose-Wiles .	10	1 biscuit	7.9	1.1	0.3	40
			*78.8	11.1	2.5	
Shredded, N. B. C. . .	30	1	24.5	3.3	0.5	120
			81.6	11.0	1.6	
Shredded Ralston . .	30	½ c.	23.2	2.6	0.3	110
			74.0	8.5	1.0	

C

Food items.	Size of portion: Grams.	Size of portion: Household measure.	Value of portion: Carb.	Prot.	Fat
Cereals:					
Ready to Eat:					
Toasted whole wheat with added wheat germ, Blue Cross .	30	1 c.	**21.3**	**4.4**	**0.6**
			70.9	14.7	2.1
Wheaties	30	1 c.	**23.5**	**3.3**	**0.5**
			78.3	11.0	1.7
Whole wheat biscuit, Kellogg	20	1, 2⅓″ x 2¼″	**16.4**	**2.0**	**0.3**
			82.2	10.1	1.7
Whole wheat flakes, Kellogg	30	¾ c.	**24.0**	**3.1**	**0.3**
			79.9	10.4	1.1
Miscellaneous:					
Corn-Soya Shreds, Kellogg	30	⅔ c.	**22.2**	**5.4**	**0.1**
			74.0	18.0	0.3
Grape-Nuts, Post . .	30	¼ c.	**24.9**	**3.2**	**0.2**
			83.2	10.6	0.6
Grape-Nuts Flakes, Post	30	1 c.	**23.2**	**3.5**	**0.4**
			77.3	11.7	1.2
Pep, Kellogg . . .	30	¾ c.	**23.1**	**3.7**	**0.6**
			77.1	12.2	1.9
Triscuit, N. B. C. . .	10	2	**8.2**	**1.1**	**0.2**
			81.7	10.5	1.6
Cereals:					
Requiring Cooking:					
Barley:					
Cream of	50	⅓ c.	**38.0**	**5.6**	**0.8**
			76.1	11.1	1.6
Corn:					
Hominy Grits, Quaker .	50	⅓ c.	**38.5**	**5.0**	**0.3**
			77.0	9.9	0.7
Hominy Grits, Pillsbury	50	⅓ c.	**39.0**	**4.4**	**0.3**
			77.9	8.8	0.6
Hominy (raw) . . .	50	¼ c.	**39.5**	**4.2**	**0.3**
			79.0	8.3	0.6
Cooked	200	1 c., sc.	**28.0**	**4.0**	**—**
			14.0	2.0	—
Hecker's cream . .	50	¼ c.	**38.6**	**4.9**	**0.2**
			77.3	9.8	0.4
Parched	45	¼ c.	**32.5**	**5.2**	**3.8**
			72.3	11.5	8.4
Samp, coarse hominy	50	¼ c.	**39.7**	**4.2**	**0.3**
			*79.4	8.3	0.5
Cornmeal:					
White, Pillsbury . .	15	1 T.	**11.7**	**1.2**	**0.2**
			78.3	8.3	1.1
White, Quaker . . .	15	1 T.	**11.6**	**1.3**	**0.2**
			77.3	8.9	1.5
Yellow, Pillsbury . .	15	1 T.	**11.8**	**1.2**	**0.2**
			78.7	8.3	1.3
Yellow, Quaker . .	15	1 T.	**11.7**	**1.3**	**0.1**
			77.8	8.5	1.0
Cooked	100	⅓ c.	**11.9**	**1.4**	**0.8**
			11.9	1.4	0.8
Oats:					
Crushed, Grandmother's	30	¼ c.	**19.6**	**4.5**	**2.0**
			65.4	14.9	6.5

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat rem
Negligible quantity is designated b

C

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
g **Cooking:**						
Oats (New style), ecker, H-O . . .	30	¼ c.	**19.9** *66 2	**4.5** 15 2	**2.2** 7.3	**120**
ther's Quaker, Quick Mother's, or Quick uaker	30	¼ c.	**19.2** 64 0	**5.3** 17.8	**1.8** 6 1	**120**
lled, raw	30	¼ c.	**19.9** 66.3	**5.0** 16.7	**2.2** 7.3	**120**
lled, cooked, calc. .	250	1 c.	**20.0** 8 0	**5.0** 2.0	**2.2** 0 9	**120**
lled, Purity . . .	30	¼ c.	**18.5** 61.6	**5.0** 16.3	**2.0** 6 1	**115**
lled	100	½ c.	**22.5** 22.5	**2.3** 2.3	**0.9** 0.9	**110**
met cereal . . .	20	1 heaping T.	**16.1** 80.7	**1.4** 7.2	Trace 0.3	**70**
eam of . .	30	¼ c.	**23.9** 79 6	**2.2** 7 4	**0.1** 0.4	**110**
atural brown, White House	20	1 heaping T.	**15.3** 76.1	**1.3** 6.7	**0.5** 2.2	**70**
hite, White House .	20	1 heaping T.	**16.2** 81.0	**1.3** 6.4	**0.1** 0.6	**75**
:						
ream of	50	½ c.	**35.9** 71.8	**6.0** 12.0	**0.8** 1.6	**180**
eat:						
Breakfast wheat, Heinz .	20	2 T.	**15.5** 77.7	**2.1** 10.5	**0.2** 0.9	**75**
racked wheat . . .	30	¼ c.	**23.0** 76.5	**3.3** 11.1	**0.5** 1.7	**115**
ream Farina, Hecker—H-O	30	¼ c.	**23.3** *77.7	**2.8** 9.5	**0.3** 1.1	**110**
ream of Wheat . .	30	¼ c.	**21.8** 72.5	**3.5** 11.8	**0.7** 2.4	**110**
ream of Wheat, cooked	170	¾ c.	**24.7** 14.5	**3.4** 2 0	**—** —	**115**
ream of Wheat, "New 5-Minute" . . .	20	2 T.	**14.6** 73.0	**2.4** 12.0	**0.3** 1.3	**70**
arina, Grandmother's, A. & P.	20	2 T.	**15.0** 75.0	**2.2** 10.8	**0.1** 0 6	**70**
arina, Pillsbury . .	20	2 T.	**14.9** 74 6	**2.1** 10 5	**0.1** 0.4	**70**
arina, Quaker . . .	20	2 T.	**15.1** 75 4	**2.4** 11.8	**0.1** 0 6	**70**
laked, cooked . . .	120	½ c.	**14.4** 12 0	**2.6** 2 2	**0.2** 0 2	**70**
Maltex Cereal .	30	¼ c.	**23.0** 76 7	**5.0** 16 7	**0.5** 1 7	**115**

C

Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb.	Prot.	Fat.
Cereals:					
Requiring Cooking:					
Wheat:					
Pettijohn's, Quaker	20	2 T.	**14.7**	**2.0**	**0.4**
			73.3	10.1	1.9
Ralston, wheat cereal	30	¼ c.	**21.0**	**4.5**	**0.5**
			70.0	15.0	1.7
Rolled, steam-cooked	30	¼ c.	**21.7**	**3.1**	**0.5**
			72.3	10.2	1.8
Rolled, with all the bran, Blue Cross	30	¼ c.	**22.0**	**3.1**	**0.5**
			73.2	10.5	1.6
Wheathearts, Sperry	30	3 T.	**21.7**	**3.9**	**0.8**
			72.3	13.0	2.7
Wheat Oata, Ralston	30	¼ c.	**20.8**	**4.2**	**1.7**
			69.3	14.0	6.9
Wheatena	30	¼ c.	**21.7**	**3.2**	**0.8**
			72.7	10.8	2.5
Wheatsworth cereal, N. B. C.	30	¼ c.	**21.2**	**4.2**	**0.6**
			70.8	14.0	2.0
Cervellata fresca, Milan sausage	60	2 oz.	**0.3**	**6.0**	**20.6**
			0.5	10.1	34.4
Chard, leaves only	100	1½ c.	**4.8**	**2.6**	**0.4**
			4.8	2.6	0.4
Chard, leaves and stalks	100	1 c.	**4.4**	**1.4**	**0.2**
			4.4	1.4	0.2
Chard, stalks only	125	1 c.	**3.6**	**1.3**	**0.1**
			2.9	1.0	0.1
Chard, cooked	100	¾ c.	**3.0**	**2.4**	**0.2**
			3.0	2.4	0.2
Chayote, fruit (Chiote)	100		**6.8**	**1.0**	**0.1**
			6.8	1.0	0.1
Chayote, leaves (Chiote)	100		**3.9**	**3.1**	**0.7**
			3.9	3.2	0.7
Chayote, roots (Chiote)	100		**19.6**	**1.8**	**0.1**
			19.6	1.8	0.1
Cheese:					
American, Kraft	30	⅛″ sl. 5# loaf		**6.8**	**9.3**
				22.5	31.0
American, pale	15	2″ x 1½″ x ½″	Trace	**4.3**	**5.4**
			*0.3	28.8	35.9
American, red	15	2″ x 1½″ x ½″		**4.4**	**5.7**
				29.6	38.3
Bel Paese	30	1 oz.		**6.3**	**7.0**
				21.3	23.5
Bondon	30	2 T.		**2.8**	**7.3**
				9.4	24.4
Brick, American	20	1⅓ cu. in.		**4.0**	**5.5**
				20.3	27.5
Brick, Kraft	30	⅛″ sl. 5# loaf		**6.6**	**9.0**
				22.0	30.0
Brie, European	25	1½″ x 1″ x ¾″		**5.2**	**8.1**
				20.9	32.4
Caciocavallo, Italian	5	1 t.		**1.7**	**1.1**
				34.3	22.0
Camembert, European	40	1 triangle		**9.0**	**10.5**
				22.2	26.3
Chateau, Borden	30	3, $\frac{3}{16}$″ sl. ½#	**1.8**	**5.6**	**7.7**
			*6.1	18.8	25.5

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remo
Negligible quantity is designated b

C

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
. . . .	25	1½" x 1½" x 1¼"	1.0 *4.1	6.9 27.7	9.2 36.8	120
can (store)	25	1½" x 1½" x 1¼"	0.3 *1.4	7.8 21.2	9.2 37.0	120
tinian	25	1½" x 1½" x 1¼"	0.2 *0.7	7.8 31.2	7.6 26.0	95
lian	25	1½" x 1½" x 1¼"		6.0 24.0	8.4 33.8	105
sh	25	1½" x 1½" x 1¼"	0.8 *3.2	6.9 27.8	7.6 30.5	100
, American . . .	25	1½" x 1½" x 1¼"		8.3 33.1	1.2 4.9	45
e	20	1 cu. in.	1.0 *5.2	5.0 25.0	6.2 30.9	80
. . . .	55	¼ c.	2.4 *4.3	11.5 20.9	0.6 1.0	65
e, Jewish	50	¼ c.		14.0 28.0	4.5 9.0	100
e, potted	50	¼ c.		10.5 21.1	17.0 34.0	200
e, skim milk . . .	50	¼ c.		11.6 23.3	0.5 1.0	50
nmieres	25	1½" x 1" x ¾"	1.2 *4.8	4.3 17.4	5.1 20.5	70
, American . . .	30	⅓ pkg.	Trace *0.2	3.0 10.0	11.4 38.0	120
, English	30	2" x 1" x ½"	0.4 *1.3	1.6 5.3	16.8 56.1	165
, demi-sel, French .	30	2" x 1" x ½"		4.3 14.5	11.9 39.9	125
ned Old English, Kraft	30	3, 3/16" sl. ½# loaf		6.0 20.0	10.1 33.5	120
yshire	20	1 cu. in.	0.9 *4.4	4.9 24.5	7.0 35.2	90
h	30	1 oz.		11.1 37.1	5.3 17.7	95
n	30	1⅛" cube	1.9 *6.3	7.1 23.5	10.2 34.0	130
n, American	30	1⅛" cube		9.3 30.9	6.8 22.7	100
nenthaler	30	2 cu. in.	0.4 *1.4	8.5 28.4	8.5 28.5	115
mage de Brie . . .	25	1½" x 1" x ¾"	0.3 *1.4	4.0 15.9	5.3 21.0	65
cream	30	2" x 1" x ½"	0.7 *2.4	7.8 25.9	10.1 33.7	130
nmelost, Norwegian .	30	1 oz.	2.9 *9.8	12.9 42.1	1.0 3.4	75
ucester	20	1 cu. in.	0.9 *4.4	5.6 28.0	5.6 28.0	80
at's milk, French . .	30	1 oz.	4.6 *15.3	10.0 33.6	8.7 25.9	140
at's milk, Norwegian .	30	1 oz.	14.0 *46.8	2.2 7.6	5.9 19.9	120
rgonzola	15	1" x ½" x 2½"	0.2 *1.6	3.8 25.2	5.2 34.7	65
uda, American . . .	30	1 oz.		8.8 29.6	7.3 24.5	105
uda, Hollander . . .	30	1 oz.		8.1 27.0	8.8 29.4	115
va	30	1 oz.	0.4 *1.4	10.3 34.2	9.1 30.4	130

C

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat
Cheese:					
Gruyère	30	2″ x 1″ x 1″	**1.4**	**9.9**	**8.4**
			*4.8	33.0	28.2
Leyden	20	1 cu. in.	**0.2**	**7.2**	**2.2**
			*1.0	35.9	11.0
Liederkranz	30	1 oz.		**5.0**	**7.3**
				16.8	24.5
Limburg, American . . .	40	1 triangle		**11.4**	**12.0**
				28.5	29.8
Limburg, European . . .	40	1 triangle		**8.5**	**7.8**
				21.3	19.6
Limburger, Kraft . . .	30	3, 3/16″ sl. ½#		**4.8**	**7.5**
				16.0	25.0
Livarot	25	1½″ x 1″ x ¾″	**2.0**	**7.9**	**5.5**
			*8.0	31.8	22.0
Mainz, hand	30	2 cu. in.		**11.1**	**1.7**
				37.3	5.6
Mozzarella	30	1 oz.	**0.5**	**8.4**	**7.3**
			*1.8	28.1	24.3
Münster	30	1⅛″ cube	**2.0**	**5.0**	**7.8**
			*6.9	16.9	25.9
Münster, American . . .	30	1⅛″ cube		**6.7**	**9.3**
				22.2	31.0
Mysost, American . . .	30	1 oz.		**2.9**	**0.8**
				9.9	2.8
Mysost (Scandinavian Primost)	30	1 oz.		**4.2**	**10.3**
				14.0	34.5
Neufchâtel	30	2 T.	**0.5**	**5.6**	**8.2**
			*1.5	18.7	27.4
Neufchâtel, American . .	30	2 T.	**0.8**	**6.4**	**5.4**
			*2.9	21.3	18.2
Noekkelost	30	1 oz.	**2.1**	**9.2**	**4.9**
			*7.0	30.6	16.3
Oka, see Port du Salut.					
Pabst-ett	15	1 T.	**1.0**	**3.0**	**3.6**
			6.6	19.9	24.3
Pabst-ett compounded Swiss cheese	30	1 oz.	**1.4**	**7.1**	**6.5**
			4.6	23.6	21.8
Parmesan	5	2 t.		**2.2**	**1.0**
				43.5	19.1
Parmesan (Formaggio) . .	5	2 t.		**2.5**	**1.1**
				49.4	22.7
Parmesan (Reggian), grated	5	2 t.		**1.7**	**1.4**
				34.8	27.3
Philadelphia cream, Kraft .	30	⅛ pkg.	Trace	**3.0**	**11.4**
			*0.2	10.0	38.0
Pimento (Cheddar) . . .	20	1 cu. in.		**3.2**	**6.4**
				16.0	32.2
Pimento, Kraft	30	⅛″ sl. 5# loaf		**6.6**	**9.1**
				22.0	30.5
Pineapple	25	1½″ x 1½″ x 1¼″	**0.7**	**7.5**	**9.7**
			2.6	29.9	38.9
Pont l'Evêque	20	1½″ x 1″ x ½″	**1.3**	**4.1**	**5.0**
			*6.7	20.3	25.0
Pont l'Evêque, American .	20	1½″ x 1″ x ½″		**5.0**	**5.9**
				25.2	29.3

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remo
Negligible quantity is designated by

C

ood items	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal.
alut (Oka, Trappist)	25	1½" x 1" x ¾"		**5.5**	**6.3**	**80**
				21.2	25.2	
. . . .	50	¼ c.		**14.0**	**4.5**	**100**
				28.0	9.0	
ottage cheese . . .	50	¼ c.		**10.5**	**17.0**	**200**
				21.1	34.0	
ne	30	1 oz.		**10.3**	**7.5**	**110**
				34.1	25.1	
r milk	30	1 oz.	**0.9**	**7.1**	**12.9**	**155**
			*3.0	23.8	43.1	
romana	50	¼ c.		**3.4**	**19.7**	**195**
				6.9	39.5	
salata	30	1 oz.	**0.6**	**4.1**	**15.4**	**160**
			*2.0	13.8	51.3	
o (Pecorino) . . .	30	1 oz.		**9.3**	**8.3**	**115**
				31.2	27.7	
ort	15	1" x ½" x 2½"	**0.3**	**3.4**	**4.4**	**55**
			*1.8	22.6	29.5	
go	5	1 t. grated		**2.1**	**0.1**	**10**
				41.7	2.0	
. . . .	30	1 oz.	**0.4**	**10.2**	**8.6**	**125**
			*1.3	34.0	28.6	
rzza	30	1 oz.	**0.5**	**8.0**	**7.7**	**105**
			*1.8	26.6	25.8	
case (Schmierkäse) .	50	¼ c.		**14.0**	**4.5**	**100**
				28.0	9.0	
ed	10	2 t.		**1.8**	**1.9**	**25**
				18.6	19.0	
n	25	1½" x 1½" x 1¼"		**7.3**	**7.8**	**105**
				29.0	31 2	
, see Cheddar, American.						
. . . .	30	1 sl.	**0.4**	**8.3**	**10.4**	**130**
			*1.3	27.6	34.9	
, European	30	1 sl.		**8.7**	**9.2**	**120**
				29.2	30.6	
, Kraft	30	⅛" sl. 5# loaf		**7.9**	**7.8**	**105**
				26.5	26.0	
, Russian	30	2" x 1" x 1"	**1.3**	**7.4**	**9.7**	**125**
			*4.4	24.9	32.3	
, Swedish	30	2" x 1" x 1"	**1.8**	**6.9**	**10.9**	**135**
			*6.1	23.2	36.4	
pist, see Port du Salut.						
eta, Kraft	30	3, 3/16" sl. ½#	**1.8**	**5.4**	**7.5**	**100**
			*6.0	18 0	25.0	
dôme	30	2 T.		**8.4**	**6.3**	**105**
				28.0	20.9	
shire	20	1 cu. in.	**0.5**	**6.8**	**3.9**	**65**
			*2.3	34.2	19.3	
hurt, American . . .	30	2 T.		**5.2**	**9.0**	**105**
				17.5	30.2	
k cream	25	2" x 1½" x 1"		**4.5**	**1.6**	**30**
				17.9	6.5	
podium, see Lambsquarters.						
ies	75	½ c.	**12.5**	**0.8**	**0.6**	**60**
			16.7	1.0	0.8	
ies, eating	75	½ c.	**8.9**	**0.4**		**40**
			*11.9	0.6		
ies, canned, see Fruits, nned.						

C

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb	Prot	Fat
Cherries, candied	10	3	**5.6**	—	0
			*55.8	0.6	[illegible]
Cherries, Maraschino, bottled	10	2	**2.8**	—	—
			*28.4	0.2	0.2
Cherry extract, Burnett, A.P.	5	1 t.	**0**	**0**	0
			0	0	0
Cherry jam	25	1 T.	**22.5**	**0.4**	—
			55.0	0.9	Trace
Cherry jelly	45	2 T.	**34.7**	**0.5**	—
			77.2	1.1	—
Chervil, leaves	20	½ c.	**2.3**	**0.7**	**0.2**
			11.5	3.4	[illegible]
Cheshire cheese	20	1 cu. in.	**1.0**	**5.0**	**6.2**
			*5.2	25.0	30.9
Chestnuts, fresh	50	8	**18.3**	**1.2**	**1.3**
			*36.6	2.3	2.7
Chestnuts, dried	35	8	**26.0**	**3.7**	**2.5**
			74.2	10.7	7.0
Chestnuts, roasted	50	20	**17.7**	**2.6**	**2.3**
			35.4	5.2	4.5
Chicken, fresh:					
Broiler	230	½ lb.		**49.6**	**5.8**
				21.5	2.5
Gizzard	75	1 med	**0.5**	**17.3**	**2.8**
			0.6	23.1	3.8
Heart	30	1 med.		**6.2**	**1.7**
				20.7	5.5
Liver	75	2 med.	**1.8**	**16.8**	**3.2**
			2.4	22.4	4.2
Young, dark meat	230	½ lb.		**47.8**	**18.9**
				20.8	8.2
Young, light meat	230	½ lb.		**50.2**	**17.0**
				21.9	7.4
Chicken, cooked:					
Boiled	115	¼ lb.		**30.1**	**11.8**
				26.2	10.3
Breast, roasted	115	¼ lb.		**35.2**	**2.3**
				30.6	2.0
‡Broiler, broiled	115	¼ lb.		**27.4**	**4.2**
				23.8	3.7
Canned, boned	115	¼ lb.		**30.1**	**13.9**
				26.2	12.1
‡Light meat, broiled	115	¼ lb.		**36.6**	**1.3**
				31.8	1.1
Roasted	60	2 oz.	**1.3**	**19.3**	**2.6**
			2.1	32.1	4.4
Roasted, cold	115	¼ lb.		**27.9**	**7.7**
				24.3	6.7
‡Thigh and leg, boiled	115	¼ lb.		**31.7**	**8.5**
				27.6	7.4
‡Thigh and leg, roasted	115	¼ lb.		**31.8**	**9.7**
				27.7	8.4
Chicken soups, see Soups.					
Chickpeas	100	½ c.	**49.9**	**21.8**	**5.0**
			49.9	21.8	5.0
Chicory, also see Endive.					
Chicory leaves, green	15	¼ sm. head	**0.6**	**0.2**	Trace
			4.0	1.6	0.2
Chicory leaves, Italian	20	½ c.	**0.2**	**0.4**	**0.1**
			0.8	1.9	0.4

* Largely assimilable. ‡ Gross fat remo
Blank space indicates lack of data. Negligible quantity is designated by

C

...ood items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
...ot	100		15.0			60
			15.0			
...arne, canned	100	½ c.	4.0	13.3	4.6	115
			4.0	13.3	4.6	
...carne, Heinz	100	½ c.	9.2	7.4	6.6	130
			9.2	7.4	6.6	
...r, dried	100		8.6	18.0	2.7	135
			*8.6	18.0	2.7	
..., com.	20	1 T.	5.2	0.5	0.2	25
			26.0	2.5	0.8	
...r celery cabbage	110	1 c.	2.6	1.5	0.1	20
			2.4	1.4	0.1	
...bbage, cooked	100	⅔ c.	2.0	1.0	0.1	13
			2.0	1.0	0.1	
...ijube	100		24.1	1.2	0.3	110
			24.1	1.2	0.3	
...ijube, dried	100		59.9	4.0		260
			59.9	4.0		
...e Chayote.						
...beef	60	⅛ lb		15.8	4.1	105
				26.4	6.9	
...resh	7	1 T.	0.4	0.3	—	3
			*5.8	3.8	0.6	
...le, chocolate-flavored ...	250	1 c.	29.8	9.0	5.0	205
			11.9	3.6	2.0	
...te:						
...age, see Cocoa, p. 711.						
...'s unsweetened	14	½ oz.	3.5	1.7	7.4	90
			25.0	12.0	53.0	
...	6	¾" x 1½" x ¼"	1.1	0.3	3.2	35
			18.0	5.5	52.9	
..., plain	6	¾" x 1½" x ¼"	3.6	0.1	1.8	30
			60.0	2.0	29.8	
..., milk	6	¾" x 1½" x ¼"	3.2	0.4	2.0	35
			54.0	6.0	33.5	
..., milk, with almonds	6	¾" x 1½" x ¼"	3.1	0.5	2.3	35
			51.0	8.0	38.6	
...te creams	14	1¼" diam. x ¾"	10.1	0.6	2.0	60
			72.0	4.0	14.0	
...low, com.	25	1 T.	0.5	—	0.8	10
			2.0	Trace	3.0	
...low, Heinz	25	1 T.	0.6	0.4	0.3	6
			2.5	1.6	1.4	
..., apple	20	1 T.	10.1	0.2	—	40
			*50.3	0.8	0.1	
..., tomato	20	1 T.	7.4	0.2	—	30
			*37.2	1.1	0.1	
...weet apple	230	1 c.	32.7	0.2	0	135
			*14.2	0.1	0	
...on buns	50	1 med.	28.0	3.9	2.7	155
			56.0	7.8	5.4	
...juice	120	½ c.	8.3	1.5	—	40
			6.9	1.3	—	
...resh, unripe	100		9.4	0.2	0.3	40
			*9.4	0.2	0.3	
...andied	75	[illegible]	58.6	0.4	1.1	250
			78.1	0.5	1.5	
...reserved	10	1 sm. piece	4.5	—	—	20
			*45.0	0.[illegible]	0.4	

C

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot	Value of portion. F…
Clams:					
Long (soft-shell), sm.	40	6	**1.1** 2.8	**5.4** 13.6	**0.7** 1.7
Long (soft-shell), med.	60	6	**1.7** 2.8	**8.1** 13.6	**1.0** 1.7
Long (soft-shell), lg.	120	6 (½ c.)	**3.4** 2.8	**16.3** 13.6	**2.0** 1.7
Long, canned	75	⅓ c.	**2.2** 2.9	**6.8** 9.0	**1.0** 1.3
Round (hard-shell), sm., "Little Neck"	70	6 (¼ c.)	**3.6** 5.2	**7.4** 10.6	**0.8** 1.1
Round (hard-shell), med. "Cherrystone"	90	6 (⅓ c.)	**4.7** 5.2	**9.5** 10.6	**0.9** 1.1
Round (hard-shell), lg.	180	6 (¾ c.)	**9.4** 5.2	**19.0** 10.6	**1.9** 1.1
Round, canned	80	⅓ c.	**2.4** 3.0	**8.5** 10.5	**0.6** 0.8
Clam bouillon, canned	120	½ c.	**1.8** 1.5	**1.7** 1.4	**0** 0
Clam chowder, canned, con.	140	½ c.	**13.6** 9.7	**4.2** 3.0	**5.7** 4.1
Clam chowder, canned	250	1 c.	**10.0** 4.0	**4.5** 1.8	**2.5** 1.0
Clapp's Baby Foods, see pages 704, 707, 709.					
Coca-Cola	180	1 bottle	**14.4** 8.0	**—** —	**—** —
Cocoa beverage, see page 163.					
Cocoa, breakfast, W. Baker	5	2 t.	**1.9** 38.0	**0.9** 19.0	**1.3** 27.0
Cocoa, powder	5	2 t.	**1.9** 37.7	**1.1** 21.6	**1.4** 28.9
Cocoa shells	100		**—** Trace	**—** Trace	**—** Trace
Cocoanut:					
Fresh	10	1″ sq.	**2.8** 27.9	**0.6** 5.7	**5.1** 50.6
Desiccated	100	1½ c.	**38.1** *38.1	**4.3** 4.3	**41.0** 41.0
Milk pack, F. Baker	100	½ c.	**8.4** 8.4	**1.8** 1.8	**17.4** 17.4
Moist, canned	100	1¼ c.	**30.0** *30.0	**4.4** 4.4	**41.4** 41.4
Premium package, F. Baker	100	1⅓ c.	**43.0** 43.0	**4.3** 4.3	**43.0** 43.0
Southern style, F. Baker	100	1¼ c.	**42.0** 42.0	**3.9** 3.9	**39.5** 39.5
Milk	120	½ c.	**5.5** *4.6	**0.5** 0.4	**1.8** 1.5
Milk, prepared	100		**31.5** 31.5	**6.3** 6.3	**57.4** 57.4
Cocomalt	9	1 T.	**7.0** 78.3	**1.2** 13.1	**0.3** 3.7
Cod:					
Boneless, salt	60	⅛ lb.		**15.8** 26.3	**0.2** 0.3

* Largely assimilable.
‡ Gross fat rem
Blank space indicates lack of data.
Negligible quantity is designated b

C

Food items.	Size of portion.		Value of portion.			
	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
	100	1 sm. piece	1.6	21.7	0.3	100
			1.6	21.7	0.3	
	115	¼ lb.	3.3	23.8	5.4	160
			*2.9	20.7	4.7	
	115	¼ lb.		31.0	6.0	185
				27.0	5.3	
	115	¼ lb.		20.7	1.0	95
				18.0	0.9	
ied	60	⅛ lb.		43.2	2.9	205
				72.0	4.9	
	230	½ lb.		25.5	0.5	110
				11.1	0.2	
oked	50	¼ c.		21.1	0.3	90
				42.3	0.5	
	230	½ lb		43.0	1.2	190
				18.7	0.5	
akes, fried	50	1 med.	4.9	6.0	6.9	110
			*9.8	12.1	13.9	
oil	14	1 T.	0	0	14.0	130
			0	0	100.0	
fried	60	2 oz.	1.8	12.4	7.1	125
			*3.0	29.6	11.9	
baked in vinegar	60	2 oz		14.4	1.9	75
				24.0	3.2	
everage	240	1 c.	1.7	0.5	—	9
			0.7	0.2	—	
beverage	70	1 demi-tasse	0.5	0.1	—	3
			0.7	0.2	—	
ereal, beverage	240	1 c.	3.4	0.5	—	15
			1.4	0.2	—	
pulverized	12	1 heaping T	0.2	1.5	1.8	25
			1.8	12.3	15.7	
roasted, ground	10	1 heaping T.	0.2	1.2	1.6	20
			1.8	12.3	15.7	
' cream, see 20% cream,						
l.						
(Colewort)	100	1 c.	7.3	4.0	0.6	50
			7.3	4.0	0.6	
, cooked	100	½ c.	5.0	3.5	0.5	40
			5.0	3.5	0.5	
ereal, rice	20	1 heaping T.	16.1	1.4	Trace	70
			80.7	7.2	0.3	
neat	115	¼ lb		21.4	0.7	95
				18.6	0.3	
ents, Relishes, etc.:						
eak sauce, com.	5	1 t., sc.	0.8	0.1	Trace	4
			16.0	2.3	1.2	
s	5	1 t.	0.3	0.2	Trace	2
			5.0	3.2	0.5	
p, tomato	20	1 T.	4.8	0.4	0.2	25
			24.0	2.0	1.0	
sauce, com.	20	1 T.	5.2	0.5	0.2	25
			26.0	2.5	0.8	
-chow, com.	25	1 T.	0.5	—	0.8	10
			2.0	Trace	3.0	
ey, apple	20	1 T.	10.1	0.2	—	40
			*50.3	0.8	0.1	
ey, tomato	20	1 T.	7.4	0.2	—	30
			*37.2	1.1	0.1	
	—	1 clove	—	—	—	—
			20.0	4.4	0.2	

C

Food items.	Size of portion. Grams.	Household measure.	Value of portion: Carb.	Prot.	Fat
Condiments, Relishes, etc.:					
Horseradish	10	2 t.	**1.9**	**0.3**	Trace
			*19.0	3.2	0.2
India relish, Heinz	25	1 T.	**7.0**	**0.1**	**0.1**
			28.0	0.5	0.3
Ketchup, tomato	20	1 T.	**5.0**	**0.5**	**0.2**
			25.0	2.5	0.8
Mustard, dry	5	1 t.	—	**0.1**	—
			0.3	2.4	0.3
Mustard, prepared	5	1 t.	**0.2**	**0.2**	**0.2**
			5.0	4.7	4.1
Olives, green	25	5	**2.9**	**0.3**	**6.9**
			11.6	1.1	27.6
Olives, ripe	20	5, 1″ long	**0.8**	**0.3**	**5.0**
			4.3	1.7	25.0
Pepper sauce (green), Heinz	5	1 t.	**0.1**	—	—
			2.9	0.7	0.5
Pepper sauce (red), Heinz	5	1 t.	**0.1**	—	**0.1**
			2.4	1.3	2.7
Peppers, red	25	3″ piece	**2.0**	**0.3**	**0.2**
			8.1	1.3	0.7
Pickles:					
Cucumber, fresh, com.	20	3 sl.	**3.2**	**0.2**	—
			15.9	1.2	0.2
Dill	50	1 med.	**1.4**	**0.2**	**0.1**
			2.7	0.5	0.3
Mixed, chopped	10	1 T.	**0.4**	**0.1**	—
			4.0	1.1	0.4
Onions, sour, com.	10	2	**0.1**	—	—
			1.0	0.2	Trace
Onions, sweet, com.	10	2	**3.7**	—	—
			3.70	0.1	Trace
Sour, chopped, com.	20	1 T.	—	**0.1**	**0.1**
			Trace	0.5	0.3
Sweet, chopped, com.	20	1 T.	**7.2**	**0.1**	**0.1**
			36.0	0.5	0.3
Sweet must'd, chopped, com.	25	1 T.	**6.3**	—	**0.2**
			25.0	Trace	0.8
Pimentos, canned	11	1 t.	**0.8**	**0.1**	Trace
			6.8	0.9	0.3
Salad dressings, see p. 685.					
Soy bean sauce (Hawaiian)	10	2 t.	**0.5**	**0.8**	
			5.0	7.8	—
Soy sauce (Toyo)	10	2 t.	**1.2**	**0.5**	**0.2**
			*12.0	4.5	1.5
Tabasco Sauce			**0**	**0**	**0**
			0	0	0
Vinegars:					
Cider	5	1 t.	Trace	**0**	**0**
			0.8	0	0
Malt	5	1 t.	Trace	**0**	**0**
			0.5	0	0
Spiced, salad	5	1 t.	**0.5**	**0**	**0**
			10.0	0	0
Tarragon	5	1 t.	Trace	**0**	**0**
			0.2	0	0
Wine	5	1 t.	Trace	**0**	**0**
			0.4	0	0

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat rem
Negligible quantity is designated b

C

ood items.	Size of portion: Grams.	Size of portion: Household measure.	Value of portion: Carb.	Value of portion: Prot.	Value of portion: Fat.	Value of portion: Cal.
s, Relishes, etc.:						
rshire sauce	5	1 t.	**1.0**	Trace	**—**	**4**
			19.0	1.1	Trace	
, canned	240	1 c.	**—**	**7.9**	**—**	**30**
			Trace	3.3	Trace	
, canned, con.	120	½ c.	**0.1**	**4.7**	**—**	**20**
			0.1	3.9	—	
, Madriléne, Heinz	240	1 c.	**1.4**	**6.7**	**—**	**35**
			0.6	2.8	Trace	
ee Crackers and Bis-						
canned	115	½ c.	**18.6**	**3.0**	**1.3**	**100**
			16.2	2.6	1.1	
bantam, canned	115	½ c.	**19.0**	**3.0**	**1.0**	**100**
			16.6	2.6	0.9	
very young	100	½ c.	**15.0**	**3.0**	**0.8**	**80**
			15.0	3.0	0.8	
canned	115	½ c.	**20.9**	**3.2**	**1.4**	**115**
			*18.2	2.8	1.2	
med.	100	1 ear, 8″	**21.0**	**3.5**	**1.1**	**110**
			21.0	3.5	1.1	
med., cooked	100	1 ear, 8″ (½ c.)	**19.2**	**3.1**	**1.0**	**100**
			*19.2	3.1	1.0	
old	100	½ c.	**26.0**	**4.5**	**1.8**	**140**
			26.0	4.5	1.8	
d	15	1 c.	**11.8**	**1.6**	**0.8**	**60**
			78.7	10.7	5.0	
ead	100	1, 4½″ sq.	**43.6**	**6.6**	**7.3**	**275**
			43.6	6.6	7.3	
owder, Heinz	250	1 c.	**20.5**	**3.7**	**6.0**	**155**
			8.2	1.5	2.4	
kes, Kellogg	30	1⅓ c.	**26.2**	**2.2**	**0.1**	**115**
			87.4	7.4	0.2	
akes, Quaker	30	1⅓ c.	**24.9**	**2.6**	**0.1**	**115**
			82.9	8.7	0.3	
beef, average	230	½ lb.		**35.9**	**59.7**	**735**
				15.6	26.2	
beef, cooked	115	¼ lb.		**16.4**	**27.3**	**320**
				14.3	23.8	
beef, canned	115	¼ lb.		**30.3**	**21.5**	**325**
				26.3	18.7	
beef hash, canned	230	½ lb.	**26.0**	**18.4**	**6.2**	**240**
			11.3	8.0	2.7	
mutton, canned	115	¼ lb.		**33.1**	**26.2**	**380**
				28.8	22.8	
al:						
e, Pillsbury	15	1 T.	**11.7**	**1.2**	**0.2**	**55**
			78.3	8.3	1.1	
e, Quaker	15	1 T.	**11.6**	**1.3**	**0.2**	**55**
			77.3	8.9	1.5	
w, Pillsbury	15	1 T.	**11.8**	**1.2**	**0.2**	**55**
			78.7	8.3	1.3	
w, Quaker	15	1 T.	**11.7**	**1.3**	**0.1**	**55**
			77.8	8.5	1.0	
ed	100	½ c.	**11.9**	**1.4**	**0.8**	**60**
			11.9	1.4	0.8	
	115	½ c.	**0**	**0**	**115.0**	**1070**
			0	0	100.0	
	14	1 T.	**0**	**0**	**14.0**	**130**
			0	0	100.0	
ad (fetticus)	25	½ c.	**0.9**	**0.5**	**0.1**	**7**
			3.6	2.0	0.4	

C

Food items.	Size of portion. Grams.	Household measure.	Value of portion: Carb.	Prot.	Fat
Cornstarch	60	½ c.	**54.0**	**—**	**—**
			90.0	—	—
Cornstarch	8	1 T.	**7.2**	**—**	**—**
			90.0	—	—
Cottage cheese	55	¼ c.	**2.4**	**11.5**	**0.6**
			*4.3	20.9	1.0
Cottage cheese, Jewish	50	¼ c.		**14.0**	**4.5**
				28.0	9.0
Cottage cheese, potted	50	¼ c.		**10.5**	**17.0**
				21.1	34.0
Cottage cheese, skim milk	50	¼ c.		**11.6**	**0.5**
				23.3	1.0
Cottolene	11	1 T.	**0**	**0**	**11.0**
			0	0	100.0
Cotton-seed oil	11	1 T.	**0**	**0**	**11.0**
			0	0	100.0
Coulommieres, French cheese	25	1½" x 1" x ¾"	**1.2**	**4.3**	**5.1**
			4.8	17.4	20.5
Cowpeas, green	100	⅔ c.	**22.7**	**9.4**	**0.6**
			22.7	9.4	0.6
Cowpeas, dried	100	½ c.	**60.8**	**21.4**	**1.4**
			60.8	21.4	1.4
Crab apples	90	6, 1½" diam.	**16.0**	**0.4**	**0.3**
			17.8	0.4	0.3
Crab apple juice	120	½ c.	**13.4**	**—**	**—**
			*11.2	—	—
Crabmeat, blue (Atlantic), canned	60	2 oz.		**10.8**	**0.2**
				18.0	0.4
Crabmeat paste	6	1 t.	**0.4**	**1.1**	**0.3**
			*6.8	18.8	5.2
Crabs, Japanese	85	½ c.		**16.9**	**0.7**
				19.9	0.8
Crabs, Norwegian	85	½ c.		**16.9**	**2.9**
				19.8	3.4
Crabs, boiled	60	2 oz.		**11.5**	**3.1**
				19.2	5.2
Crabs (Eastern, hard), canned	85	½ c.	**0.6**	**13.4**	**1.3**
			0.7	15.8	1.5
Cracker meal	100	¾ c.	**72.9**	**10.9**	**6.0**
			72.9	10.9	6.0
Cracked wheat	115	1 c.	**88.0**	**12.8**	**2.0**
			76.5	11.1	1.7
Crackers and Biscuits:					
Afternoon tea	3	1	**2.6**	**0.2**	**0.5**
			77.7	6.3	14.9
Animal	2	1	**1.9**	**0.1**	**0.3**
			81.0	5.9	12.6
Arrowroot	4	1	**3.6**	**0.2**	**0.6**
			82.0	4.7	12.9
Boston	25	4	**17.8**	**2.8**	**2.1**
			71.1	11.0	8.5
Butter	12	3, 2" diam.	**8.6**	**1.2**	**1.2**
			71.6	9.6	10.0
Cocoanut bars	10	2	**7.2**	**0.6**	**1.7**
			71.6	6.2	16.7
Cookies, crisp, thin, rich	10	1	**7.0**	**0.8**	**1.8**
			69.8	7.8	18.0
Cookies, soft, thick	20	1	**14.6**	**1.4**	**2.1**
			73.0	6.8	10.5

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remo…
Negligible quantity is designated b…

Food items.	Size of portion: Grams	Size of portion: Household measure.	Value of portion. C: Carb.	Prot.	Fat.	Cal.
…nd Biscuits:						
…iced thinly	10	1	6.3	0.6	2.5	50
			63.4	5.7	24.9	
…d thickly	20	1	15.0	0.8	2.0	85
			75.0	4.0	10.0	
…	25	2, 3″ diam.	17.4	2.4	3.3	110
			69.7	9.7	12.1	
…	35	4	23.3	4.4	4.9	160
			66.6	12.6	14.0	
…	30	2	22.7	1.3	1.4	110
			75.8	4.2	4.8	
…tons	30	2	23.0	1.3	0.6	105
			76.8	4.4	2.0	
…lock tea	12	3	9.1	1.0	1.4	55
			75.6	7.9	11.5	
…snaps	30	8, 1½″ diam.	22.8	2.0	2.6	155
			76.0	6.5	8.6	
…	25	3, 3″ sq.	18.5	2.5	2.4	110
			73.8	10.0	9.4	
…, N. B. C.	25	3	19.2	1.9	2.5	110
			76.6	7.6	9.8	
…ashioned, Sunshine	7	1	5.4	0.5	0.8	30
			77.2	7.3	11.6	
…l, N. B. C	20	6	15.5	1.5	1.9	85
			77.7	7.7	9.4	
…hine	7	1	5.6	0.5	0.8	35
			80.8	7.2	12.3	
…*crackers*, Sunshine	3	1	2.5	0.3	0.4	15
			73.4	9.9	12.2	
…ingers	0	5, 2½″ long	21.2	2.6	1.5	110
			70.6	8.8	5.0	
… Doone	25	3	16.4	1.7	5.5	125
			65.7	6.9	22.1	
…roons	25	2, 1⅝″ diam.	16.3	1.6	3.8	110
			65.2	6.5	15.2	
…oth	20	1, 6″ diam.	14.0	3.0	—	70
			70.0	15.0	—	
…oth, N. B. C.	25	4	21.8	2.6	0.2	100
			86.7	10.5	0.9	
…ses cookies	10	1	7.7	0.6	0.9	40
			76.7	6.4	8.9	
…co, vanilla	20	6	14.3	1.1	4.2	100
			71.7	5.4	21.2	
…al	35	3	24.0	4.1	3.9	150
			69.0	11.8	11.1	
…r	25	⅔ c.	17.6	2.8	2.6	110
			70.5	11.3	10.5	
…r, Sunshine	18	½ c.	14.2	1.7	2.0	85
			78.7	9.6	10.9	
…*ettes*, N. B. C.	13	12	9.2	1.3	1.4	55
			70.7	9.9	10.6	
…t cookies	10	1	5.4	1.4	2.8	55
			53.5	14.0	27.5	
…bread	25	1 cracker	18.6	2.8	1.3	100
			74.2	11.1	5.0	
…*risp*, Ralston	6	1	3.7	0.8	0.1	20
			*61.9	13.1	2.0	
…*a Biscuit*, N. B. C.	11	3	7.7	1.0	1.4	50
			70.1	9.3	12.9	
…es	20	3 double	13.7	2.1	2.5	90
			68.5	10.6	12.7	
…es, Sunshine	3	1	2.5	0.3	0.5	15
			75.8	9.4	14.7	

C

Food items.	Size of portion. Grams.	Household measure.	Value of [illegible] Carb.	Prot.	[illegible]
Crackers and Biscuits:					
Sandwich-type, com.	15	1	**10.8**	**0.8**	**2.9**
			72.2	5.0	19.[illegible]
Saratoga Flakes, N. B. C.	11	3	**7.6**	**1.1**	**1.3**
			69.3	10.0	12.[illegible]
Social tea	14	3	**11.1**	**1.2**	**1.3**
			79.4	8.2	9.[illegible]
Soda	10	3, 2″ sq.	**7.3**	**1.0**	**1.0**
			73.1	9.8	9.1
Soda, Loose-Wiles	7	1	**5.4**	**0.6**	**0.5**
			80.6	9.6	7.5
Soda, N. B. C.	20	3	**15.0**	**1.5**	**1.9**
			74.9	7.3	9.4
Soda, Sunshine	6	1	**4.4**	**0.6**	**0.7**
			75.7	9.6	12.2
Toasted Dainties, whole wheat, N. B. C.	13	4	**10.1**	**1.3**	**1.0**
			77.3	9.6	7.4
Uneeda Biscuit	20	3	**14.5**	**2.2**	**2.1**
			71.8	11.1	10.5
Vanilla wafers	10	3	**7.2**	**0.6**	**1.5**
			72.4	6.1	14.9
Water	18	2	**13.6**	**2.1**	**0.9**
			75.7	11.7	5.0
Wheatsworth, N. B. C.	10	2	**7.6**	**0.9**	**0.9**
			75.5	8.7	9.3
Crackels, Quaker	30	1 c.	**24.1**	**3.3**	**0.1**
			80.2	10.9	0.4
Cranberries	50	½ c.	**4.2**	**0.2**	**0.3**
			*8.4	0.4	0.6
Cranberry sauce	100	⅓ c.	**44.6**	**0.2**	**0.3**
			44.6	0.2	0.3
Crayfish (Eastern)	115	¼ lb.	**1.2**	**18.4**	**0.6**
			1.0	16.0	0.5
Crayfish, boiled	60	2 oz.		**11.6**	**0.5**
				19.3	0.8
Cream, see Milks.					
Cream cheese, American	30	⅓ pkg.	Trace	**3.0**	**11.4**
			*0.2	10.0	38.0
Cream cheese, English	30	2″ x 1″ x ½″	**0.4**	**1.6**	**17.4**
			*1.3	5.3	56.1
Cream cheese, demi-sel, French	30	2″ x 1″ x ½″		**4.3**	**11.9**
				14.5	39.9
Cream of barley	50	½ c.	**38.0**	**5.6**	**0.8**
			76.1	11.1	1.6
Cream of rice	30	¼ c.	**23.9**	**2.2**	**0.1**
			79.6	7.4	0.4
Cream of rye	50	⅓ c.	**35.9**	**6.0**	**0.8**
			71.8	12.0	1.6
Cream of Wheat	30	¼ c.	**21.8**	**3.5**	**0.7**
			72.5	11.8	2.4
Cream of Wheat, cooked	170	¾ c.	**24.7**	**3.4**	—
			14.5	2.0	—
Cream of Wheat, "new 5-minute"	20	2 T.	**14.6**	**2.4**	**0.3**
			73.0	12.0	1.3

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat rem
Negligible quantity is designated b

C

ood items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
en	20	½ c.	0.8	0.8	0.3	9
			*4.1	4.2	1.4	
r	20	½ c.	0.8	0.2	0.2	6
			4.0	1.0	1.0	
	12	1 T.	—	—	12.0	110
			—	—	100.0	
	230	½ lb.		41.4	6.9	205
				18.0	3.0	
hite, dried	55	½ c.	41.8	7.2	1.1	210
			76.0	13.0	2.0	
	75	2½" x 2"	1.3	0.6	0.2	10
			*1.7	0.8	0.2	
, cooked	50	2 T.	0.3	0.3	—	2
			0.7	0.5	Trace	
pickle, fresh, com.	20	3 sl.	3.2	0.2	—	14
			15.9	1.2	0.2	
e	100	1 c.	9.9	3.8	0.9	65
			9.9	3.8	0.9	
black) jam, com.	25	1 T.	17.2	0.1	—	70
			*68.8	0.5	Trace	
(black) juice	120	½ c.	13.1	0.6	—	55
			*10.9	0.5	—	
(red) jelly, com.	12	1 t.	7.9	Trace	—	30
			*66.0	0.3	Trace	
(red) juice	120	½ c.	12.1	0.4	—	50
			10.1	0.3	—	
:						
	50	½ c.	3.3	0.5	—	15
			*6.6	0.9	Trace	
, stewed without sugar	80	1 c.	2.9	0.5	—	14
			*4.6	0.6	Trace	
	50	½ c.	2.2	0.6	—	12
			*4.4	1.1	Trace	
stewed without sugar	80	1 c.	2.6	0.6	—	13
			*3.2	0.8	Trace	
e	50	½ c.	2.8	0.7	—	18
			*5.6	1.3	Trace	
, dried	50	⅓ c.	31.5	0.8	—	130
			*63.1	1.7	—	
meat	60	2 oz.	5.2	4.7	6.7	105
			*8.7	7.9	11.1	
owder	0.5	⅕ t.	—	—	—	—
			*26.1	9.5	10.8	
(squash)	125	1 c.	9.1	1.5	0.4	45
			7.3	1.2	0.3	
d-apple	100	1	18.1	2.1	—	90
			*18.1	2.1	Trace	
d:						
na	50		8.9	1.2	1.3	55
			*17.9	2.5	2.6	
baked	50		4.7	2.6	2.9	55
			*9.4	5.2	5.9	
boiled	50		6.3	2.3	2.6	60
			*12.7	4.7	5.3	
zen	60	2 oz.	10.8	2.4	5.4	105
			*18.0	4.0	9.0	
	100	1 sl.	27.7	5.5	14.4	270
			*27.7	5.5	14.4	
fish	115	¼ lb.	0.8	16.0	1.7	85
			*0.8	14.0	1.5	

D

D

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion Carb.	Value of portion Prot.	Value of portion Fat
Damson plum	50	8 med.	4.8	0.2	
			*9.6	0.5	
Damson plum jam	25	1 T.	13.3	0.3	—
			53.0	1.2	Trace
Dandelion greens	50	½ c.	5.3	1.2	0.5
			10.6	2.4	1.[illegible]
Dasheens	100	1 tuber	23.5	2.9	0.2
			*23.5	2.9	0.2
Date pudding, Heinz	50		24.1	1.7	4.9
			48.2	3.5	9.[illegible]
Dates, fresh	15	3	5.4		
			*35.8		
Dates, dried	13	2 lg.	9.5	0.2	0.2
			*73.5	1.7	1.9
Derbyshire cheese	20	1 cu. in.	0.9	4.9	7.0
			*4.4	24.5	35.2
Dill pickles, com.	20	½ sm.	0.1	0.2	0.1
			0.5	0.9	0.[illegible]
Dock or sorrel	25	½ c.	Trace	0.5	Trace
			*0.1	2.1	0.2
"Double" cream, see 40% cream, p. 664.					
Doughnuts	45	1, 3″ diam.	24.0	3.0	9.5
			53.1	6.7	21.0
Dripping, beef	10	1 T.	0	0	9.9
			0	Trace	99.0
Duck, domesticated	230	½ lb.		49.2	19.0
				21.4	8.2
Duck, wild	230	½ lb.		49.0	12.0
				21.3	5.2
Duck gizzard	100	1 lg.	0.6	21.3	3.7
			0.6	21.3	3.7
‡Duck, roasted	115	¼ lb.		36.3	5.4
				31.6	4.7
Duck, roasted, cold	115	¼ lb.		31.2	7.0
				27.1	6.1
Duck egg, see Eggs.					
Dumpling	100		24.0	3.3	11.1
			*24.0	3.3	11.1
Dutch heads (kohlrabi)	100	½ c.	4.2	2.0	0.1
			*4.2	2.0	0.1

E

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat
Edam cheese	30	1⅛″ cube	1.9	7.1	10.2
			*6.3	23.5	34.0
Edam cheese, American	30	1⅛″ cube		9.2	6.8
				30.9	22.7
Eels, Mediterranean	230	½ lb.	2.3	37.5	40.9
			*1.0	16.3	17.8
Eels, salt water	230	½ lb.		42.8	20.9
				18.6	9.1
Eels, smoked	115	¼ lb.		21.4	32.0
				18.6	27.8
Eels, stewed	60	2 oz.		6.6	10.9
				11.0	18.1

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat rem[oved]
Negligible quantity is designated b[y]

E

ood items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
preserved (Pidan)	100	1 lg.	—	**26.8**	**18.5**	285
			—	26.8	18.5	
	65	1 av.	—	**8.6**	**9.4**	125
			—	13.3	14.5	
	40	1 av.	—	**4.4**	—	20
			—	11.1	Trace	
	25	1 av.	—	**4.2**	**9.3**	105
			—	16.8	36.2	
e	70	1 av.	—	**9.7**	**9.1**	125
			—	13.8	14.4	
e	45	1 av.	—	**5.3**	—	20
			—	11.6	Trace	
	25	1 av.	—	**4.4**	**9.1**	100
			—	17.3	36.2	
-hen:						
le	30	1 av.	—	**4.1**	**3.6**	50
			—	13.5	12.0	
te, bulk	100			**11.6**	—	50
				11.6	Trace	
s, bulk	100			**16.7**	**31.8**	375
				16.7	31.8	
ole	50	1 av.	—	**6.7**	**5.2**	75
			—	13.4	10.5	
Pullet's egg	40	1 av.				
ite	35	1 av.	—	**4.3**	**0.1**	20
			—	12.3	0.2	
lk	15	1 av.	—	**2.4**	**5.0**	55
			—	15.7	33.3	
own egg	50	1 av.	—	**5.9**	**5.6**	75
			—	11.9	11.2	
hite egg	50	1 av.	—	**5.9**	**5.4**	75
			—	11.8	10.8	
hydrated (dried) eggs	30	1 oz.	—	**12.0**	**13.1**	170
			—	40.0	43.7	
er, whole	25	1 av.	—	**2.7**	**2.9**	40
			—	10.7	11.7	
key:						
hole	80	1 av.	—	**10.7**	**9.0**	130
			—	13.4	11.2	
hite	50	1 av.	—	**5.7**	—	25
			—	11.5	Trace	
olk	30	1 av.	—	**5.1**	**8.9**	105
			—	17.4	32.9	
tle, fresh water	100		—	**18.1**	**11.1**	175
			—	18.1	11.1	
tle, sea water	35	1 med.	—	**6.6**	**3.4**	60
			—	18.8	9.8	
cooked:						
d	100	2	0	**14.1**	**19.5**	240
			0	14.1	19.5	
elette	100		—	**7.6**	**30.3**	315
			—	7.6	30.3	
ched	50	1	0	**6.2**	**5.8**	80
			0	12.4	11.7	
ambled	100	2	**0.6**	**10.1**	**25.2**	280
			*0.6	10.1	25.2	
uit	100		**41.0**	**3.4**	**1.9**	190
			41.0	3.4	1.9	

E

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.
Eggplant	250	2 sl.	**10.8**	**3.0**	**0.5**
			*4.3	1.2	[illegible]
Eiweissmilch	240	1 c.	**3.3**	**7.2**	**5.5**
			*1.4	3.0	[illegible]
Emmenthaler cheese	30	2 cu. in.	**0.4**	**8.5**	**8.5**
			*1.4	28.4	[illegible]
Endive, chicory, leaves	15	½ sm. head	**0.6**	**0.2**	Trace
			4.0	1.6	0.2
Endive, white chicory, French	45	1 sm. crown	**1.3**	**0.7**	**0.1**
			2.9	1.6	0.3
Escarole (Batavian endive)	50	⅓ heart	**0.5**	**0.6**	Trace
			*0.9	1.1	0.1
Eulachon (Columbia River smelt)	230	½ lb.		**30.4**	**25.7**
				13.2	11.2

F

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.
Farina	20	2 T.	**15.0**	**2.2**	**0.1**
			75.0	11.0	0.5
Fats, see Oils.					
Fave beans	75	½ c.	**3.1**	**4.0**	**—**
			4.2	5.4	—
Fave beans, dried	75	½ c.	**36.1**	**17.7**	**1.8**
			48.2	23.6	2.5
Fennel	50	½ (3″ diam.)	**1.8**	**0.9**	**0.1**
			3.6	1.9	0.2
Fetticus (cornsalad)	25	½ c.	**0.9**	**0.5**	**0.1**
			3.6	2.0	0.4
Figs, fresh, Florida	45	1 lg.	**5.3**	**0.3**	**0.2**
			*11.7	0.6	0.5
Figs, candied	15	1	**11.0**	**0.5**	**—**
			73.7	3.5	0.2
Figs, canned	85	3	**34.8**	**1.0**	**0.3**
			40.9	1.2	0.3
Figs, dried	45	2 lg.	**23.8**	**1.6**	**—**
			*52.9	3.6	—
Figs, Smyrna, processed	45	3	**23.1**	**1.4**	**0.2**
			*51.3	3.0	0.4
Fig jam	25	1 T.	**12.8**	**0.2**	**—**
			51.2	0.7	Trace
Fig pudding, Heinz	50		**24.5**	**2.0**	**6.0**
			49.0	4.0	12.1
Filberts (hazelnuts), raw, unsalted	35	20	**3.3**	**5.2**	**23.0**
			*9.3	14.9	65.6
Filberts (hazelnuts), roasted, salted	35	20	**4.4**	**4.9**	**23.3**
			*12.6	14.1	66.6
Finnan haddie	230	½ lb.		**39.0**	**23.0**
				17.0	10.0
Finocchio (fennel)	50	½ (3″ diam.)	**1.8**	**0.8**	**0.1**
			3.6	1.9	0.2
Fish and Other Sea Food, see specific item.					

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remo[ved]
Negligible quantity is designated by

F

ood items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
, English:						
	6	1 t.	0.1	1.2	0.7	12
			*2.5	20.6	12.1	
	6	1 t.	0.2	1.2	0.7	12
			*4.0	20.1	12.0	
	6	1 t.	0.4	1.1	0.3	9
			*6.8	18.8	5.2	
	6	1 t.	0.2	0.9	0.6	10
			*3.0	15.5	9.8	
	6	1 t.		1.3	0.5	10
				21.6	8.6	
and anchovy	6	1 t.	0.5	0.8	0.5	10
			*8.5	14.0	9.1	
and shrimp	6	1 t.	0.2	1.1	0.5	10
			*4.2	18.2	9.3	
and tomato	6	1 t.	0.5	1.1	0.6	12
			*7.9	19.0	9.6	
	6	1 t.	0.1	1.1	0.7	11
			*2.5	18.3	11.5	
chocolate flavored made from powder	250	1 c.	24.2	4.5	0.7	125
			9.7	1.8	0.3	
chocolate flavored made from syrup	250	1 c.	29.5	4.0	1.5	150
			11.8	1.6	0.6	
d	100		73.6	14.9	0.5	365
			73.6	14.9	0.5	
r	230	½ lb.		32.7	1.4	145
				14.2	0.6	
r, fried	115	¼ lb.	7.5	19.5	14.8	250
			*6.5	17.0	12.9	
(Italian)	100	⅔ c.	40.8	3.4	—	180
			*40.8	3.4	—	
root	26	2 T.	26.0	—	—	105
			100.0	—	—	
a or pisang	100	¾ c.	72.5	3.5	0.8	320
			72.5	3.5	0.8	
meal and flour	130	1 c.	82.2	13.7	2.9	420
			72.8	10.5	2.2	
wheat (sifted)	115	1 c.	89.6	7.4	1.4	410
			77.9	6.4	1.2	
	130	1 c.	99.1	10.9	2.3	470
			76.2	8.4	1.8	
nseed	100		21.3	49.1	12.7	405
			21.3	49.1	12.7	
a, Battle Creek Food	100	¾ c.	43.3	44.8	1.8	390
			43.3	44.8	1.8	
n, see also items below.						
Medal, family, enriched	115	1 c. sifted	86.8	12.1	1.2	405
			75.5	10.5	1.0	
Medal, phosphated, ched	115	1 c. sifted	86.2	12.1	1.2	405
			75.0	10.5	1.0	
Medal, self-rising, ched	115	1 c. sifted	81.6	11.5	1.2	385
			71.0	10.0	1.0	
m, Wheatsworth, B. C.	100	⅔ c.	74.6	11.4	2.4	375
			74.6	11.4	2.4	
ean	100	1½ c. sc.	63.0	21.5	1.4	360
			63.0	21.5	1.4	
t	100	1¼ c.	36.5	51.2	5.0	405
			36.5	51.2	5.0	

F

Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb.	Prot.	Fat
Flours:					
Oat	75	1 c.	**49.3**	**11.3**	**4.8**
			65.7	15.1	6.4
Pancake, Aunt Jemima, Quaker	100	¾ c.	**71.6**	**10.4**	**1.5**
			71.6	10.4	1.5
Pancake, Pillsbury	100	¾ c.	**76.0**	**7.9**	**1.2**
			*76.0	7.9	1.2
Pancake, Sperry	140	1 c.	**104.7**	**11.9**	**1.7**
			74.8	8.5	1.2
Pillsbury's Best	100	1 c.	**75.0**	**11.2**	**1.0**
			*75.0	11.2	1.0
Pisang (banana)	100	¾ c.	**72.5**	**3.5**	**0.8**
			72.5	3.5	0.8
Potato	100	¾ c.	**83.0**	**0.5**	**0.1**
			83.0	0.5	0.1
Prepared soy gluten casein, Loeb	100	1 c.	**26.0**	**42.0**	**11.0**
			*26.0	42.0	11.0
Pure gluten, Loeb	100	¾ c.	**43.0**	**41.0**	**2.0**
			*43.0	41.0	2.0
Rice	100	¾ c.	**68.0**	**8.6**	**6.1**
			68.0	8.6	6.1
Rye, whole-grain	100	1⅓ c.	**75.2**	**11.2**	**1.7**
			75.2	11.2	1.7
Rye, light, Pillsbury	100	1 c.	**78.7**	**9.9**	**1.4**
			*78.7	9.9	1.4
Rye, medium, Pillsbury	90	1 c.	**69.0**	**9.5**	**1.3**
			*76.6	10.4	1.5
Rye, dark, Pillsbury	100	1⅓ c.	**70.6**	**15.4**	**2.6**
			*70.6	15.4	2.6
Self-rising gluten, Loeb	100	¾ c.	**40.0**	**38.0**	**2.0**
			*40.0	38.0	2.0
Self-rising, Wheatsworth, N. B. C.	100	¾ c.	**67.9**	**12.3**	**2.1**
			67.9	12.3	2.1
Sno Sheen cake	100	1 c.	**78.5**	**7.8**	**1.1**
			*78.5	7.8	1.1
Softasilk cake	100	1 c.	**73.5**	**7.5**	**0.9**
			73.5	7.5	0.9
Soya	100	1 c.	**15.6**	**46.7**	**2.7**
			*15.6	46.7	2.7
Soy bean	100	1 c.	**8.0**	**45.0**	**11.0**
			8.0	45.0	11.0
Soy, Battle Creek Food Co.	100	1 c.	**33.4**	**33.6**	**21.3**
			33.4	33.6	21.3
Swans Down cake	100	1 c.	**78.2**	**7.6**	**0.8**
			78.2	7.6	0.8
Wheat, patent	100	¾ c.	**75.9**	**10.8**	**0.9**
			75.9	10.8	0.9
Wheat, patent, enriched	100	¾ c.	**75.9**	**10.8**	**0.9**
			75.9	10.8	0.9
Wheat, self-rising	115	1 c.	**83.8**	**11.7**	**1.0**
			72.9	10.2	0.9
Wheat, self-rising, enriched	115	1 c.	**83.8**	**11.7**	**1.0**
			72.9	10.2	0.9
Whole wheat, *Gold Medal*	130	1 c.	**89.1**	**18.2**	**2.6**
			68.5	14.0	2.0
Whole wheat, Pillsbury	100	¾ c.	**70.8**	**13.4**	**2.0**
			*70.8	13.4	2.0
Flying fish, Mediterranean	115	¼ lb.	**1.3**	**22.1**	**1.3**
			1.1	19.2	1.1

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat rem
Negligible quantity is designated b

F

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
hole wheat flakes .	30	1 c.	**23.8**	**3.4**	**0.3**	**115**
			*79.5	11.4	1.1	
pecific item.						
sausage (Frank-						
. . . .	120	2, 7" x ¾"	**1.3**	**23.5**	**22.3**	**310**
			1.1	19.6	18.6	
er, all meat . . .	120	2, 7" x ¾"		**16.9**	**25.0**	**300**
				14.1	20.8	
er, added cereal . .	120	2, 7" x ¾"	**18.2**	**16.9**	**4.0**	**180**
			15.2	14.1	3.3	
lad dressing . . .	11	2 t.	**—**	**—**	**6.6**	**60**
			—	—	60.0	
lad dressing, com. .	11	2 t.	**2.0**	**0.1**	**3.9**	**45**
			*18.1	0.6	35.5	
s	230	½ lb.		**35.7**	**0.5**	**150**
				15.5	0.2	
de Brie, American .	25	1½" x 1" x ¾"	**0.4**	**4.0**	**5.3**	**65**
			*1.4	15.9	21.0	
de Brie, European .	25	1½" x 1" x ¾"		**5.2**	**5.6**	**125**
				20.9	22.4	
ustard	60	2 oz.	**10.8**	**2.4**	**5.4**	**105**
			*18.0	4.0	9.0	
ods, same analyses as oducts.						
e, dark	60	1 sl.	**33.5**	**3.1**	**8.3**	**230**
			55.9	5.2	13.8	
ke, dark, N. B. C. .	60	1 sl.	**37.8**	**2.9**	**8.3**	**245**
			63.0	4.8	13.8	
ke, light, N. B. C. .	60	1 sl.	**39.0**	**2.6**	**7.5**	**240**
			65.0	4.4	12.5	
lad, see Fruits, canned.						
rups, com.	15	1 T.	**7.5**	**—**	**0**	**30**
			*50.0	0.1	0	
Canned:† Refer also to ic item.						
ricots, fancy . . .	120	½ c.	**66.0**	**0.6**	**—**	**275**
		3 halves	55.0	0.5	—	
ricots, choice . .	120	½ c.	**48.0**	**0.7**	**—**	**200**
		4 halves	40.0	0.6	—	
ricots, standard . .	120	½ c.	**30.0**	**0.8**	**—**	**125**
		3 halves	25.0	0.7	—	
ricots, light syrup . .	120	½ c.	**20.3**	**1.1**	**—**	**90**
			17.3	0.9	—	
ckberries, extra heavy yrup	120	⅔ c.	**67.7**	**1.0**	**—**	**280**
			56.4	0.8	-	
ckberries, fancy . .	120	⅔ c.	**48.0**	**1.0**	**—**	**200**
			40.0	0.8	—	

eral description of grades of canned fruits: **Fancy**—the top grade; fruit of ve quality packed in extra heavy syrup ranging from 40 to 70 per cent. the grade between the top and standard grades; fruit of fine quality packed in rup containing 10 to 15 per cent less sugar. **Standard**—the medium grade; good quality packed in medium syrup of about 20 to 25 per cent. **Second**— econd quality packed in 10 per cent syrup; when packed in water, this fruit is ignated **water**; when for bakery use, it may be designated **pie** and **solid packed pie**. syrup is used on apricots, peaches, and plums, and, beginning with 10 per cent weight on Seconds, increases in steps of 15 per cent to each grade. **Light syrup** n pears, cherries, and grapes, and, beginning with 10 per cent sugar by weight ds, increases in steps of 10 per cent to each grade.

bohydrate percentages represent added syrup; available carbohydrate in the f is negligible by comparison where the syrup is 20 per cent or more. All pro- entages are approximate.

F

Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb	Prot.	Fat
Fruits, Canned†:					
Blackberries, choice	120	⅔ c.	**36.0**	**1.1**	**—**
			30.0	0.9	—
Blackberries, standard	120	⅔ c.	**24.0**	**1.1**	**—**
			20.0	0.9	—
Blueberries, fancy	120	½ c.	**72.0**	**0.5**	**—**
			60.0	0.4	—
Blueberries, choice	120	½ c.	**48.0**	**0.6**	**—**
			40.0	0.5	—
Blueberries, standard	120	½ c.	**24.0**	**0.7**	**—**
			20.0	0.6	—
Blueberries, very light syrup	120	½ c.	**15.4**	**0.7**	**—**
			12.8	0.6	—
Cherries:					
Fancy[1]	85	½ c., 12	**34.0**	**0.4**	**—**
			40.0	0.5	—
Choice[1]	85	½ c., 15	**25.5**	**0.5**	**—**
			30.0	0.6	—
Standard[1]	85	½ c., 20	**17.0**	**0.5**	**—**
			20.0	0.6	—
Red, pitted, fancy	100	½ c.	**70.0**	**0.2**	**—**
			70.0	0.2	—
Red, pitted, choice	100	½ c.	**50.0**	**0.2**	**—**
			50.0	0.2	—
Red, pitted, standard	100	½ c.	**30.0**	**0.3**	**—**
			30.0	0.3	—
Figs	85	½ c., 3	**34.8**	**1.0**	**0.3**
			40.9	1.2	0.3
Fruit salad, fancy	140	1 c.	**33.6**	**0.7**	**—**
			24.0	0.5	—
Fruit salad, choice	140	1 c.	**28.0**	**0.7**	**—**
			20.0	0.5	—
Grapefruit	135	¾ c.	**17.1**	**0.7**	**0.3**
			12.7	0.5	0.2
Grapes, Muscat, fancy	120	½ c.	**48.0**	**0.6**	**—**
			40.0	0.5	—
Grapes, Muscat, choice	120	½ c.	**36.0**	**0.6**	**—**
			30.0	0.5	—
Grapes, Muscat, standard	120	½ c.	**24.0**	**0.7**	**—**
			20.0	0.6	—
Loganberries	75	⅓ c.	**21.0**	**0.5**	**—**
			28.0	0.7	—
Peaches, fancy	140	2 halves	**77.0**	**0.5**	**—**
			55.0	0.3	—
Peaches, choice	140	2 halves	**56.0**	**0.6**	**—**
			40.0	0.4	—
Peaches, standard	140	3 halves	**35.0**	**0.7**	**—**
			25.0	0.5	—
Pears, Bartlett, fancy	120	2 halves	**48.0**	**0.2**	**—**
			40.0	0.2	—
Pears, Bartlett, choice	120	2 halves	**36.0**	**0.3**	**—**
			30.0	0.3	—
Pears, Bartlett, standard	120	3 halves	**24.0**	**0.5**	**—**
			20.0	0.4	—
Pineapple, heavy syrup	150	2 sl.	**54.6**	**0.6**	**1.1**
			36.4	0.4	0.7
Pineapple, medium syrup	150	2 sl.	**37.5**	**0.6**	**1.1**
			25.0	0.4	0.7
Pineapple, light syrup	150	2 sl.	**22.5**	**0.6**	**0.2**
			15.0	0.4	0.1

[1] Black, white and Royal Anne cherries.
† See footnote on page 647.
* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat rem[…]
Negligible quantity is designated b[…]

F

od items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal
ed†:						
fancy	100	2, ½ c.	55.0	0.3	—	225
			55.0	0.3	—	
choice	100	2, ½ c.	40.0	0.4	—	165
			40 0	0.4	—	
standard	100	3, ½ c.	25.0	0.5	—	105
			25.0	0 5	—	
	100	3	22.3	0.5	0.1	95
			22.3	0.5	0.1	
erries:						
k, fancy	140	⅔ c.	56.0	1.3	1.3	245
			40.0	0.9	0.9	
k, choice	140	⅔ c.	42.0	1.4	1.4	190
			30.0	1.0	1.0	
ck, standard	140	⅔ c.	28.0	1.5	1.5	135
			20.0	1.1	1.1	
l, fancy	140	⅔ c.	84.0	0.8	—	350
			60.0	0.6	—	
l, choice	140	⅔ c.	56.0	1.0	—	235
			40.0	0.7	—	
d. standard	140	⅔ c.	28.0	1.1	—	120
			20.0	0.8	—	
vberries	120	⅔ c.	33.6	0.5	0	140
			28.0	0.4	0	
ried:						
	60	⅛ lb.	39.7	1.0	1.3	180
			66.1	1.6	2.2	
ts	25	6 halves	10.8	1.2	0.3	50
			*43.4	4.7	1.0	
ts, Zante	50	⅓ c.	31.5	0.8	—	130
			*63.1	1.7	—	
	13	2 lg.	9.5	0.2	0.2	40
			*73.5	1.7	1.9	
	45	2 lg.	23.8	1.6	—	105
			*52.9	3.6	—	
	25	10 (large pits) 8 (small pits)	17.5	0.9	0.1	75
			70.0	3.6	0.5	
es	50	3, 1¾" diam.	26.5	1.7	—	115
			*53.0	3.4	—	
	75	4 halves	27.0	1.7	0.3	120
			*36.0	2.3	0.4	
es	100	8 lg.	40.3	2.4	—	175
			*40.3	2.4	—	
ns, Muscat, seeded	75	½ c.	48.3	0.8	—	200
			*64.4	1.1	—	
ns, Sultana or Thompson seedless	60	⅓ c.	38.8	1.0	—	165
			*64.7	1.7	—	
berries	40	¼ c.	32.1	2.9	0.7	150
			80.2	7.3	1.8	
Glacé:						
cots	20	1 med.	17.3	—	—	70
			86.5	0.6	0.2	
ries	10	3	5.6	—	0	25
			*55.8	0.6	0	
	15	1	11.0	0.5	—	45
			73.7	3.5	0.2	
	30	1 oz.	22.8	0.4	0.2	95
			75.9	1.3	0.6	
apple	50	1 sl.	40.0	0.4	0.2	165
			80.0	0.8	0.4	
Juices:						
le	120	½ c.	15.0	0.1	—	60
			12.5	0.1	—	

ee footnote on page 647.

F

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat
Fruit, Juices:					
Blackberry	120	½ c.	**8.4**	**0.4**	**—**
			7.0	0.3	—
Blueberry	120	½ c.	**14.9**	**0.1**	**—**
			*12.4	0.1	—
Carambola	225	1 c.	**23.2**	**0.2**	**0.2**
			10.3	0.1	0.1
Cider, sweet apple	230	1 c.	**32.7**	**0.2**	**0**
			*14.2	0.1	0
Citrang	120	½ c.	**8.3**	**1.5**	**—**
			6.9	1.3	—
Crab apple	120	½ c.	**13.4**	**—**	**—**
			*11.2	—	—
Currant, black	120	½ c.	**13.1**	**0.6**	**—**
			*10.9	0.5	—
Currant, red	120	½ c.	**12.0**	**0.4**	**—**
			10.1	0.3	—
Granadilla	30	1 oz.	**5.7**	**0.2**	**—**
			19.1	0.6	—
Grape:					
Catawba type	120	½ c.	**24.2**	**0.5**	**—**
			20.2	0.4	—
Concord	120	½ c.	**20.8**	**0.4**	**—**
			17.3	0.3	—
Delaware	120	½ c.	**26.5**	**0.4**	**—**
			22.1	0.3	—
Muscadine	120	½ c.	**15.6**	**0.1**	**—**
			13.0	0.1	—
Welch, certified	120	½ c.	**18.1**	**0.4**	**—**
			15.1	0.3	—
Grapefruit, California	120	½ c.	**11.5**	**0.5**	**0.1**
			9.8	0.4	0.1
Grapefruit, Florida	120	½ c.	**15.2**	**0.6**	**0.2**
			12.7	0.5	0.2
Lemon	15	1 T.	**1.5**	**—**	**—**
			9.8	—	—
Lime	15	1 T.	**1.2**	**0.1**	**—**
			7.8	0.5	—
Limequat	15	1 T.	**1.0**		
			*6.8		
Loganberry	120	½ c.	**12.1**	**0.7**	**—**
			10.1	0.6	—
Muskmelon	120	½ c.	**10.9**		**—**
			*9.1		—
Orange, California	120	½ c.	**15.7**	**0.7**	**—**
			13.1	0.6	—
Passion fruit, natural	30	1 oz.	**3.5**	**0.4**	
			*11.5	1.4	
Peach	120	½ c.	**15.4**	**0.2**	**—**
			12.8	0.2	—
Pineapple	120	½ c.	**15.4**	**0.4**	**0.4**
			12.8	0.3	0.3
Pineapple, Hawaiian	120	½ c.	**15.9**	**0.4**	**0.4**
			*13.3	0.3	0.3
Pomegranate juice	120	½ c.	**13.9**	**0.2**	**—**
			*11.6	0.2	—
Prune	120	½ c.	**34.6**	**1.0**	**0**
			28.8	0.8	0
Quince	120	½ c.	**10.9**	**0.4**	**—**
			*9.1	0.3	—

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remov
Negligible quantity is designated by

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal
...es:						
...rry, black	120	½ c.	**12.8**	**0.2**	**—**	**55**
			10.7	0.2	—	
...rry, red	120	½ c.	**10.0**	**0.5**	**—**	**45**
			8.3	0.4	—	
...rry	120	½ c.	**6.1**	**0.2**	**—**	**25**
			5.1	0.2	—	
...	120	½ c.	**10.8**	**0.8**	**—**	**50**
			9.0	0.7	—	
...ine	120	½ c.	**10.0**	**1.1**	**0.4**	**50**
			9.2	0.9	0.3	

G

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal
...ost cheese, Norwegian	30	1 oz.	**2.9**	**12.6**	**1.0**	**70**
			*9.8	42.1	3.4	
...	—	1 clove	**—**	**—**	**—**	**—**
			20.0	4.4	0.2	
...r fisch	60	⅛ lb.	**3.1**	**9.6**	**5.6**	**105**
			5.1	16.0	9.4	
...	3	1 t.	**—**	**2.7**	**—**	**10**
			—	91.4	0.1	
..., Knox, Sparkling	7	1 pkg.	**0**	**6.0**	**—**	**25**
			0	85.5	Trace	
...Baby Foods, see ...704, 708, 709.						
...ale	225	1 c.	**36.0**	**—**	**—**	**150**
			16.0	—	—	
...ale, Canada Dry	225	1 c.	**20.3**	**—**	**—**	**85**
			9.0	—	—	
..., crystallized	25	1 sm. piece	**21.9**	**—**	**—**	**90**
			87.5	—	—	
..., ground	100		**60.0**	**7.4**	**0.4**	**280**
			*60.0	7.4	0.4	
...roots	100		**9.8**	**1.8**	**1.5**	**60**
			*9.8	1.8	1.5	
...snaps	30	8, 1½″ diam.	**22.8**	**2.0**	**2.6**	**155**
			76.0	6.5	8.6	
...bread	60	1 sq.	**30.8**	**2.5**	**7.1**	**205**
			51.4	4.2	11.9	
...d, fresh:						
...ken	75	1 med.	**0.5**	**17.3**	**2.8**	**100**
			0.6	23.1	3.8	
...k	100		**0.6**	**21.3**	**3.7**	**125**
			0.6	21.3	3.7	
...se	100		**0**	**21.4**	**5.3**	**135**
			0	21.4	5.3	
...key	100		**1.3**	**20.5**	**10.6**	**190**
			1.3	20.5	10.6	
...ster cheese	20	1 cu. in.	**0.9**	**5.6**	**5.6**	**80**
			*4.4	28.0	28.0	
...e, com.	16	1 T.	**14.4**	**—**	**—**	**60**
			*90.0	—	—	
...flour, see Flours.						
...milk	240	1 c.	**9.1**	**9.6**	**10.1**	**170**
			*3.8	4.0	4.2	
...milk, evaporated, Mey-...rg	15	1 T.	**1.3**	**1.0**	**1.0**	**20**
			*8.8	7.0	7.1	
...milk cheese, French	30	1 oz.	**4.6**	**10.0**	**7.7**	**130**
			*15.3	33.6	25.9	
...milk cheese, Norwegian	30	1 oz.	**14.0**	**2.2**	**5.9**	**120**
			*46.8	7.6	19.9	

G

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat
Goose, young	230	½ lb.		37.5	83.3
				16.3	36.2
Goose, roast	115	¼ lb.		32.2	25.8
				28.0	22.4
Goose egg, see Eggs.					
Goose gizzard	100	1 med.		21.4	5.3
				21.4	5.3
Goose liver	100	2 med.	3.7	16.6	15.9
			3.7	16.6	15.9
Gooseberries, green	100	¾ c.	3.4	1.1	—
			*3.4	1.1	—
Gooseberries, ripe	100	¾ c.	9.2	0.6	—
			*9.2	0.6	—
Gooseberries, canned, water pack	120	½ c.	7.2	0.6	0.2
			6.0	0.5	0.2
Gooseberries, canned, in syrup	120	½ c.	22.2	0.6	0.2
			18.5	0.5	0.2
Gooseberry pie	100	1 sl.	31.0	2.8	9.4
			*31.0	2.8	9.4
Gorgonzola cheese	15	1″ x ½″ x 2½″	0.2	4.2	5.2
			*1.6	28.2	34.7
Gouda cheese, American	30	1 oz.		8.8	7.3
				29.6	24.5
Gouda cheese, Hollander	30	1 oz.		8.1	8.8
				27.0	29.4
Goya cheese	30	1 oz.	0.3	10.3	9.1
			*1.4	34.2	30.4
Graham crackers	25	3, 3″ sq.	18.5	2.5	2.4
			73.8	10.0	9.4
Graham flour, Wheatsworth, N. B. C.	100	¾ c.	74.6	11.4	2.4
			74.6	11.4	2.4
Graham or whole wheat bread	25	1 sl.	12.0	2.4	0.9
			48.0	9.5	3.5
Grapes, black	100	20	15.5	0.6	—
			*15.5	0.6	—
Grapes, Concord	100	24	14.9	1.4	1.4
			14.9	1.4	1.4
Grapes, Malaga	100	15	16.7	0.8	0.4
			16.7	0.8	0.4
Grapes, white	100	30	16.1	0.6	—
			*16.1	0.6	—
Grapes, canned, see Fruits, canned.					
Grape butter	35	2 T.	20.5	0.4	Trace
			58.5	1.2	0.1
Grape juice:					
Catawba type	120	½ c.	24.2	0.5	—
			20.2	0.4	—
Concord	120	½ c.	20.8	0.4	—
			17.3	0.3	—
Delaware	120	½ c.	26.5	0.4	—
			22.1	0.3	—
Muscadine	120	½ c.	15.6	0.1	—
			13.0	0.1	—
Welch, certified	120	½ c.	18.1	0.4	—
			15.1	0.3	—
Grapefruit	100	½, 4″ diam.	5.3	0.6	—
			*5.3	0.6	—

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remov[ed]
Negligible quantity is designated by

G

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
, canned, water pack	135	¾ c.	10.8	0.7	0.3	50
			8.0	0.5	0.2	
, canned, juice pack	135	¾ c.	12.2	0.7	0.3	55
			9.0	0.5	0.2	
, canned, in syrup .	135	¾ c.	18.2	0.7	0.3	75
			13.5	0.5	0.2	
juice, canned, un-ed	120	½ c.	10.2	0.5	0.1	45
			*8.5	0.4	0.1	
t juice, canned, sweet-	120	½ c.	16.8	0.5	0.1	70
			*14.0	0.4	0.1	
t peel, candied . .	10	1 sm. piece	8.1	—	—	35
			80.6	0.4	0.3	
ts, Post	30	½ c.	24.9	3.2	0.2	115
			83.2	10.6	0.6	
ts Flakes, Post . .	30	1 c.	23.2	3.5	0.4	115
			77.3	11.7	1.2	
ans, canned . . .	100	½ c.	3.4	1.2	0.1	20
			3.4	1.2	0.1	
ans, see also beans,						
ge plums	50	3 med.	5.9	0.4	—	25
			*11.8	0.8	—	
cooked:						
. . . .	135	½ c.	4.3	3.0	—	30
			3.2	2.2	—	
oli	100	½ c.	3.7	3.0	0.1	30
			3.7	3.0	0.1	
d	100	⅔ c	3.0	2.4	0.2	25
			3.0	2.4	0.2	
rds	100	½ c.	5.0	3.5	0.5	40
			5.0	3.5	0.5	
. . . .	100	½ c.	4.0	1.8	0.3	25
			4.0	1.8	0.3	
ale (sea-cabbage) . .	100	½ c.	0.3	0.4	0.1	4
			0.3	0.4	0.1	
ch	100	½ c.	0.8	2.0	0.2	15
			0.8	2.0	0.2	
ip tops	100	½ c.	3.0	2.0	0.2	20
			3.0	2.0	0.2	
, salad:						
ge	75	1½ c.	0.2	2.1	0.3	12
			*0.3	2.8	0.4	
ry or endive	15	½ sm. head	0.6	0.2	Trace	3
			4.0	1.6	0.2	
ry, Italian	20	½ c.	0.2	0.4	0.1	3
			0.8	1.9	0.4	
salad	25	½ c.	0.9	0.5	0.1	7
			3.6	2.0	0.4	
elion	50	½ c.	5.3	1.2	0.5	30
			10.6	2.4	1.0	
ole	50	½ heart	0.5	0.6	Trace	5
			*0.9	1.1	0.1	
en cress	20	½ c.	0.8	0.8	0.3	9
			*4.1	4.2	1.4	
ce	50	2 lg. leaves	0.5	0.6	0.2	6
			*1.0	1.2	0.3	
ard	50	½ c.	2.0	1.2	0.2	15
			4.0	2.3	0.3	
ard and cress	20	½ c.	0.2	0.3	—	2
			*0.9	1.6	—	
ane	100		2.5	1.6	0.4	20
			*2.5	1.6	0.4	

G

Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb.	Prot.	Fat.
Greens, salad:					
Romaine	50	5 leaves	**1.5**	**0.5**	**—**
			3.0	1.0	—
Roquette	100		**0.3**	**0.7**	**0.4**
			*0.3	0.7	0.4
Sorrel or dock	25	½ c.	Trace	**0.5**	Trace
			*0.1	2.1	0.2
Turnip	50	½ c.	**3.2**	**2.1**	**0.3**
			6.3	4.2	0.6
Watercress	20	½ c.	**0.1**	**0.6**	**—**
			*0.7	2.9	—
Grits, Hominy	50	⅓ c.	**39.0**	**4.4**	**0.3**
			77.9	8.8	0.6
Groats, Robinson's Patent	9	1 T.	**6.4**	**1.1**	**0.5**
			*71.5	12.4	6.0
Grouper, red	230	½ lb.		**44.4**	**1.4**
				19.3	0.6
Grouse, roast	115	¼ lb.		**34.6**	**6.0**
				30.1	5.3
Gruyère cheese	30	2″ x 1″ x 1″	**1.4**	**9.9**	**8.4**
			*4.8	33.0	28.2
Guava, common	15	1 sm.	**2.6**	**0.2**	**0.1**
			17.1	1.0	0.6
Guava, common, Fla.	15	1 sm.	**0.7**	**0.1**	**0.1**
			*4.8	0.8	0.6
Guava, strawberry	15	2 sm.	**2.7**	**0.2**	**0.1**
			18.2	1.2	0.6
Guinea hen	230	½ lb.		**53.1**	**15.0**
				23.1	6.5
Guinea hen, roast	115	¼ lb.		**37.4**	**9.4**
				32.5	8.2
Guinea hen egg, see Eggs.					
Gumbo (okra)	50	7, 2½″ pods	**2.0**	**0.8**	**0.1**
			*4.0	1.6	0.2
Gumbo soup, Creole, canned	250	1 c.	**7.5**	**1.8**	**0.7**
			3.0	0.7	0.3

H

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.
Haddock	230	½ lb.		**39.6**	**0.7**
				17.2	0.3
Haddock, fresh, fried	115	¼ lb.	**4.1**	**23.5**	**9.5**
			*3.6	20.4	8.3
Haddock, steamed	115	¼ lb.		**28.3**	**0.3**
				24.6	0.3
Haddock, smoked	115	¼ lb.		**26.8**	**0.2**
				23.3	0.2
Haddock, smoked, steamed	115	¼ lb.		**25.6**	**1.0**
				22.3	0.9
Hake	230	½ lb.		**35.4**	**1.6**
				15.4	0.7
Hake, fried	115	¼ lb.	**6.0**	**22.2**	**13.1**
			*5.3	19.3	11.4
Hake, steamed	115	¼ lb.		**21.3**	**3.8**
				18.5	3.3
Halibut, cooked	115	¼ lb.		**23.5**	**4.6**
				20.4	4.0
Halibut, smoked	115	¼ lb.		**23.9**	**17.3**
				20.8	15.0
Halibut steak	230	½ lb.		**42.8**	**12.0**
				18.6	5.2

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remov
Negligible quantity is designated by

G

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
teamed	115	¼ lb.		**27.7**	**1.9**	**130**
				24.1	1.7	
(P. D. & Co.)	2.4	½ t.	**0**	**0**	**2.4**	**20**
			0	0	100.0	
(P. D. & Co.)	0.7	20 drops	**0**	**0**	**0.7**	**6**
			0	0	100.0	
ean	230	½ lb.		**57.5**	**33.1**	**545**
				25.0	14.4	
medium	230	½ lb.		**35.2**	**66.5**	**770**
				15.3	28.9	
or boiled	115	¼ lb.		**30.4**	**5.6**	**175**
				26.4	4.9	
d	115	¼ lb.		**33.0**	**5.0**	**180**
				28.7	4.3	
l	20	1 T.		**3.8**	**6.8**	**80**
				19.0	34.1	
ed, boiled	33	1 sl.	**—**	**7.3**	**6.8**	**95**
			—	22.1	20.6	
l, lean	230	½ lb.		**25.5**	**47.8**	**630**
				19.8	20.8	
d, medium	230	½ lb.		**37.5**	**89.2**	**995**
				16.3	38.8	
ked, parboiled and ed	115	¼ lb.		**32.2**	**4.4**	**175**
				28.0	3.8	
heese, Mainz	30	2 cu. in.		**11.2**	**1.7**	**55**
				37.3	5.6	
ast	115	¼ lb.		**35.9**	**8.0**	**225**
				31.2	7.0	
s (beans), cooked	125	½ c.	**20.7**	**8.2**	**—**	**120**
			*16.6	6.6	Trace	
olets, canned	130	½ c.	**14.9**	**5.9**	**0.1**	**85**
			*11.5	4.6	0.1	
, canned	130	⅔ c.	**2.6**	**1.4**	**0.1**	**15**
			*2.0	1.1	0.1	
scarlet	20	10 med.	**3.7**	**0.4**	**0.1**	**20**
			*18.7	2.0	0.6	
uts (filberts), raw, un- d	35	20	**3.3**	**5.2**	**23.0**	**250**
			*9.3	14.9	65.6	
uts (filberts), roasted, d	35	20	**4.4**	**4.9**	**23.3**	**255**
			*12.6	14.1	66.6	
heese	115	¼ lb.		**17.2**	**23.3**	**285**
				15.0	20.3	
fresh:						
lean	115	¼ lb.	**0.8**	**19.4**	**4.3**	**125**
			0.7	16.9	3.7	
lean with visible fat	115	¼ lb.	**0.1**	**17.7**	**23.8**	**295**
			0.1	15.4	20.7	
ken	30	1 med.	**0.5**	**6.2**	**2.1**	**45**
			1.6	20.5	7.0	
	115	¼ lb.	**0.5**	**19.4**	**5.5**	**135**
			0.4	16.9	4.8	
o	115	¼ lb.	**1.2**	**19.3**	**11.0**	**185**
			1.0	16.8	9.6	
ey	30	1 oz.	Trace	**4.9**	**3.8**	**55**
			0.2	16.2	12.7	
	115	¼ lb.	**0.9**	**17.7**	**8.2**	**155**
			0.8	15.4	7.1	
cooked:						
o, roast	60	2 oz.		**15.0**	**8.8**	**145**
				25.0	14.7	

Baby Foods, see pages 708, 709.

H

Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb.	Prot.	Fat
Herring, lake	100	1 sm.		19.0	3.6
				19.0	[illegible]
Sea	100	1 sm.		19.0	11.0
				19.0	[illegible]
Salted	100	1 sm.		19.6	11.3
				19.6	11.3
Baked in vinegar	100	1 sm.		16.9	12.9
				16.9	12.9
Fried	100	1 sm.	1.5	21.8	15.1
			*1.5	21.8	15.1
Canned	115	¼ lb.		23.8	14.3
				20.7	12.4
Canned in tomato sauce	115	¼ lb.	4.2	18.2	12.1
			3.7	15.8	10.5
Pickled	60	⅛ lb.		15.0	11.8
				25.0	19.7
Smoked:					
Bloaters	115	¼ lb.		22.6	15.4
				19.7	13.6
Hard	50	2½″ sq.		18.5	7.9
				36.9	15.8
Herring, smoked:					
Kippered	115	¼ lb.		26.2	18.8
				22.8	16.3
Roe, fried	60	2 oz.	2.8	14.0	9.5
			*4.7	23.4	15.8
Hickory nuts	35	¼ c.	4.0	5.4	23.6
			11.4	15.4	67.4
Holland rusk	15	1	10.5	1.8	0.7
			70.4	12.1	5.1
Hollandaise sauce	40	2 T.	—	1.0	17.5
			—	2.5	43.8
Hominy:					
Raw	50	¼ c.	39.5	4.2	0.3
			79.0	8.3	0.6
Hecker's cream	50	¼ c.	38.6	4.9	0.2
			77.3	9.8	0.4
Parched	45	¼ c.	32.5	5.2	3.8
			72.3	11.5	8.4
Pearl, Quaker	50	¼ c.	38.6	4.6	0.5
			77.2	9.1	1.0
Cooked	200	1 sc. c.	28.0	4.0	—
			14.0	2.0	—
Hominy Grits, Quaker	50	⅓ c.	38.5	5.0	0.3
			77.0	9.9	0.7
Hominy Grits, Pillsbury	50	⅓ c.	39.0	4.4	0.3
			77.9	8.8	0.6
Honey	25	1 T.	20.3	0.1	—
			81.2	0.4	—
Alfalfa	25	1 T.	20.4	Trace	—
			81.7	0.1	—
Buckwheat	25	1 T.	19.5	Trace	—
			78.1	0.1	—
Orange	25	1 T.	19.7	Trace	—
			78.6	0.1	—
White clover	25	1 T	19.4	Trace	—
			77.5	0.1	—
Honeydew melon	240	¾ c. diced	14.2	1.4	0.2
			5.9	0.6	0.1
Horlick's Malted Milk	8	1 T.	5.4	1.3	0.7
			*68.0	16.4	8.8
Horseradish, evaporated, Heinz	3	1 T.	2.0	0.5	—
			66.8	15.6	0.9

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat rem
Negligible quantity is designated b

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
h, roots, fresh	10	2 t.	1.9	0.3	Trace	9
			*19.0	3.2	0.2	
ries	100	⅔ c.	9.7	0.6	0.6	50
			*9.7	0.6	0.6	
I						
n:						
errun	50	1 "roll"	10.5	2.0	6.0	110
			*21.0	4.0	12.0	
rade	50	1 "roll"	9.0	1.7	11.5	150
			*18.0	3.5	23.0	
	85	1 gill	18.2	2.3	15.3	225
			*21.5	2.7	18.0	
erical flavors:						
colate	85	1 gill	21.2	4.5	9.4	195
			*24.9	5.3	11.0	
ee	85	1 gill	19.1	3.8	8.1	170
			*22.5	4.5	9.5	
n, com.:						
wberry	85	1 gill	18.3	3.4	7.7	160
			*21.5	4.0	9.0	
illa	85	1 gill	19.1	3.8	10.2	190
			*22.5	4.5	12.0	
m cones, *Trumpet*, N.						
	5	1	4.2	0.4	0.1	20
			83.9	8.1	1.7	
moss (lichen)	10	1 T.	—	0.9	—	3
			70.0	8.7	—	
it	60	2 oz.	16.2	0.1	0.1	65
			*27.0	0.1	0.1	
ater, com.	120	½ c.	39.5	0.6	0	165
			33.0	0.5	0	
nuts, see Pine nuts.						
oss (algæ)	10	1 T.	—	0.7	—	3
			*0.4	6.8	—	
ew	115	¼ lb.	9.0	4.4	12.6	170
			*7.8	3.8	11.0	
s, sturgeon	3	1 t.	—	2.7	Trace	10
			—	89.3	1.6	
J						
preserves, av.	12	1 t.	7.7	—	—	30
			64.0	—	—	
	25	¼ box	21.5	2.8	0	100
			86.0	11.0	0	
ll	50	1 sl.	27.7	2.4	9.5	210
			*55.4	4.8	19.0	
, Chinese	100		24.1	1.2	0.3	110
			24.1	1.2	0.3	
, Chinese, dried	100		59.9	4.0		260
			59.9	4.0		
, Fla.	25	10 av.	3.1	0.2	0.1	14
			*12.3	1.0	0.4	
e soup, canned, conc.	120	½ c.	1.1	3.1	—	15
			0.9	2.6	—	
Foods see p. 707.						
:						
ream	85	1 gill	18.2	2.3	15.3	225
			*21.5	2.7	18.0	
der, caramel	12	1 T. (¼ pkg.)	11.8	—	—	50
			98.8	0.1	0.1	

K

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat
Junket Powder:					
Lemon	11	1 T. (¼ pkg.)	**10.9**	**—**	**—**
			98.8	0.1	0.1
Chocolate	14	1 T. (¼ pkg.)	**12.3**	**0.3**	**0.6**
			87.7	2.1	4.1
Orange	11	1 T. (¼ pkg.)	**10.9**	**—**	**—**
			98.8	0.1	0.1
Raspberry	11	1 T. (¼ pkg.)	**10.8**	**—**	**—**
			98.0	0.1	0.1
Vanilla	11	1 T. (¼ pkg.)	**10.8**	**—**	**—**
			98.0	0.2	0.1
Tablet	0.5	1	**—**	**—**	**—**
			—	—	—

K

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat
Kaki, Japanese persimmon	100	1 lg.	**20.0**	**0.8**	**0.4**
			20.0	0.8	0.4
Kale, leaves	175	1¾ c.	**12.6**	**6.8**	**1.1**
			7.2	3.9	0.6
Kale, cooked	100	½ c.	**4.0**	**1.8**	**0.3**
			4.0	1.8	0.3
Karo, powdered	8	1 T.	**7.6**	**0**	**0**
			*95.0	0	0
Karo syrup, Blue Label	20	1 T.	**14.8**	**0**	**0**
			*74.0	0	0
Karo syrup, Green Label	160	½ c.	**120.0**	**0**	**0**
			*75.0	0	0
Karo syrup, Red Label	160	½ c.	**120.0**	**0**	**0**
			*75.0	0	0
Kephir	100	1 wine glass	**1.6**	**3.1**	**2.0**
			1.6	3.1	2.0
Ketchup, tomato	20	1 T.	**5.0**	**0.5**	**0.2**
			25.0	2.5	0.8
Kidney beans, baked, com.	250	1 c.	**52.5**	**18.8**	**3.8**
			21.0	7.5	1.5
Kidney beans, red, canned	250	1 c.	**43.3**	**17.5**	**0.5**
			*17.3	7.0	0.2
Kidneys, fresh:					
Beef	155	⅓ c. diced	**1.4**	**23.3**	**12.6**
			0.9	15.0	8.1
Pork	115	¼ lb.	**0.8**	**17.8**	**5.6**
			0.7	15.5	4.8
Sheep	115	¼ lb.	**1.1**	**19.0**	**3.5**
			1.0	16.5	3.2
Veal	115	¼ lb.	**0.2**	**19.3**	**6.0**
			0.2	16.8	5.2
Kidneys, cooked:					
Ox, stewed	115	¼ lb.		**29.6**	**6.7**
				25.7	5.8
Sheep, fried	115	¼ lb.		**32.2**	**10.5**
				28.0	9.1
Kingfish	230	½ lb.		**43.5**	**2.1**
				18.9	0.9
Kippered herring, canned	115	¼ lb.	**0**	**26.2**	**18.8**
			0	22.8	16.3
Kippers, baked	60	2 oz.		**13.9**	**6.8**
				23.2	11.4
Kippers, salted	115	¼ lb.		**23.6**	**9.8**
				20.5	8.5
Kix, General Mills	35	1⅓ c.	**28.8**	**2.8**	**0.7**
			82.3	8.0	1.9
Kohlrabi (Dutch heads)	100	½ c.	**4.2**	**2.0**	**0.1**
			*4.2	2.0	0.1

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remo
Negligible quantity is designated by

L

ood items.	Size of portion. Grams.	Household measure.	Value of portion Carb.	Prot.	Fat.	Cal.
tems	50	½ c.	**3.4**	**1.1**	**0.1**	20
			6.7	2.1	0.1	
ooked	100	⅓ c.	**2.5**	**1.0**	—	14
			*2.5	1.0	—	
. . . . . .	100		**45.4**	**4.9**	**1.3**	220
			*45.4	4.9	1.3	
. . . .	100	1 wine glass	**3.6**	**2.7**	**7.0**	90
			3.6	2.7	7.0	
chocolate-flavored	250	1 c.	**27.8**	**7.5**	**3.8**	180
			11.1	3.0	1.5	
. . . .	50	3 med.	**7.5**	**0.3**	**0.1**	35
			15.0	0.7	0.3	

L

cid milk; see milks, ed.						
ers	30	5, 2½" long	**21.2**	**2.6**	**1.5**	110
			70.6	8.8	5.0	
esh:						
. . . .	230	½ lb.		**21.8**	**16.8**	245
				9.5	7.3	
. . . .	230	½ lb.		**43.9**	**54.3**	685
				19.1	23.6	
uarter	230	½ lb.		**42.1**	**59.3**	725
				18.3	25.8	
quarter	230	½ lb.		**45.1**	**43.9**	595
				19.6	19.1	
ind, medium fat . .	230	½ lb.		**44.2**	**37.0**	525
				19.2	16.5	
. . . .	230	½ lb.		**43.0**	**65.1**	780
				18.7	28.3	
e	230	½ lb.	**1.6**	**34.8**	**62.1**	725
			0.7	15.1	27.0	
. . . .	230	½ lb.		**40.7**	**57.0**	695
				17.7	24.8	
der	230	½ lb.		**41.6**	**68.3**	805
				18.1	29.7	
. . . .	230	½ lb.		**40.5**	**53.1**	660
				17.6	23.1	
cooked:						
p, broiled	115	¼ lb.		**35.6**	**8.6**	225
				31.0	7.5	
, spring, roasted . .	115	¼ lb.		**35.2**	**6.8**	210
				30.6	5.9	
sted, cold	115	¼ lb.		**28.4**	**13.8**	245
				24.7	12.0	
, canned	115	¼ lb.	**8.6**	**7.8**	**5.2**	115
			7.5	6.8	4.5	
gue, canned	115	¼ lb.		**14.8**	**22.2**	265
				12.9	19.3	
quarters (Chenopodium)	75	1½ c.	**6.2**	**2.9**	**0.5**	40
			8.3	3.8	0.7	
quarters, Algerian . .	70	1¼ c.	**7.4**	**5.3**	**0.6**	60
			10.5	7.6	0.9	
refined	15	1 T.	0	0	**15.0**	140
			0	0	100.0	
unrefined	15	1 T.	—	**0.3**	**14.1**	130
			—	2.2	94.0	
bulbs and leaves . .	55	½ c.	**2.4**	**1.4**	**0.2**	15
			*4.4	2.5	0.4	
, cooked	100	⅔ c.	**4.0**	**2.0**	**0.2**	25
			*4.0	2.0	0.2	
s	100	1, 2" diam.	**7.4**	**1.0**	**0.7**	40
			*7.4	1.0	0.7	

L

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat
Lemonade, plain	240	1 c.	**24.0**	**—**	**—**
			10.0	—	—
Lemon juice	15	1 T.	**1.5**	**—**	**—**
			9.8[1]	—	—
Lemon juice, canned	15	1 T.	**1.2**	**—**	**—**
			8.0	0.4	0.3
Lemon peel, candied	10	1 sm. piece	**8.1**	**—**	**—**
			80.6	0.4	0.3
Lemon extract, Burnett, A.P.	5	1 t.	**0**	**0**	**0**
			0	0	0
Lentils, cooked	100	½ c.	**28.0**	**12.0**	**4.5**
			28.0	12.0	4.5
Lentils, dried	60	½ c.	**32.8**	**15.4**	**0.6**
			54.7	25.7	1.0
Lettuce	50	2 lg. leaves	**0.5**	**0.6**	**0.2**
			*1.0	1.2	0.3
Lettuce, cooked	100	½ c.	**0.5**	**0.5**	**0.1**
			0.5	0.5	0.1
Leyden cheese	20	1 cu. in.	**0.2**	**7.2**	**2.2**
			*1.0	35.9	11.0
Libby, homogenized foods, see page 706.					
Lichi nuts, see Litchi.					
Lichens, see Iceland moss.					
Liederkranz cheese	30	1 oz.		**5.0**	**7.3**
				16.8	24.5
Lima beans, green	75	½ c.	**16.5**	**5.6**	**0.6**
			*22.0	7.5	0.8
Lima beans, yellow, cooked	125	½ c.	**27.5**	**11.2**	**1.0**
			22.0	9.0	0.8
Lima beans, canned	130	½ c.	**19.0**	**5.2**	**0.4**
			14.6	4.0	0.3
Lima beans, dried	75	½ c.	**49.4**	**13.6**	**0.5**
			65.9	18.1	1.5
Lima bean flour	100	1¼ c. sc.	**63.0**	**21.5**	**1.4**
			63.0	21.5	1.4
Limburg cheese, American	40	1 triangle		**11.4**	**12.0**
				28.5	29.8
Limburg cheese, European	40	1 triangle		**8.5**	**7.8**
				21.3	19.6
Limes	40	1, 1½″ long	**4.9**	**0.3**	**Trace**
			12.3	0.8	0.1
Limes, Florida	40	1 med.	**0.2**	**0.3**	**Trace**
			0.5	0.8	0.1
Lime juice	15	1 T.	**1.2**	**0.1**	**—**
			7.8	0.5	—
Limequat juice, Florida	15	1 T.	**1.0**		
			*6.8		
Limu, see Algae, Hawaiian.					
Ling cod	230	½ lb.		**37.0**	**—**
				16.1	Trace
Ling, fried	115	¼ lb.	**7.2**	**19.3**	**14.3**
			*6.3	16.8	12.4
Ling, steamed	115	¼ lb.		**25.8**	**0.9**
				22.4	0.8
Litchi	25	10 (large pits) 8 (small pits)	**17.5**	**0.9**	**0.1**
			70.0	3.6	0.5
Livarot cheese	25	1½″ x 1″ x ¾″	**2.0**	**7.9**	**5.5**
			*8.0	31.8	22.0

* Largely assimilable. ‡ Gross fat rem...

Blank space indicates lack of data. Negligible quantity is designated by...

[1] Sugar content 2.3 per cent, remainder citric acid.

od items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
:						
. . .	230	½ lb.	5.8	46.9	12.4	310
			2.5	20.4	5.4	
.	75	2 med.	1.8	16.8	3.2	105
			2.4	22.4	4.2	
. . . .	100	2 med.	3.7	16.6	15.9	230
			3.7	16.6	15.9	
. . . .	230	½ lb.	11.6	53.2	20.8	460
			5.0	23.1	9.0	
. . . . . .	230	½ lb.	3.2	49.2	10.4	310
			1.4	21.4	4.5	
. . . .	100		0.7	22.0	4.8	140
			0.7	22.0	4.8	
ed:						
fried	115	¼ lb.	2.8	33.3	16.7	305
			2.4	29.0	14.5	
l	115	¼ lb.	4.6	33.9	18.3	330
			4.0	29.5	19.5	
e (paté de foie gras)	6	1 t.	0.3	0.7	2.6	30
			4.8	11.4	43.8	
age or pudding . .	60	2 oz.	0.9	10.0	12.4	195
			1.5	16.7	20.6	
ooked	100	1 av.	0.4	17.2	1.9	90
			0.4	17.2	1.9	
laked	100	⅔ c.	0.4	16.4	1.8	85
			0.4	16.4	1.8	
canned	90	½ c.	0.4	16.3	1.0	80
			0.5	18.1	1.1	
aste	6	1 t.	0.2	0.9	0.6	10
			*3.0	15.5	9.8	
ries	75	⅔ c.	2.5	0.8	—	15
			*3.4	1.1	—	
ries, canned . . .	120	⅔ c.	33.6	0.8	0	140
			28.0	0.7	0	
ry juice	120	½ c.	12.1	0.7	—	65
			10.1	0.6	—	
n syrup	18	1 T.	11.9	0	0	50
			*66.0	0	0	
. . . .	25	1 med.	2.5	0.1	Trace	10
			*10.1	0.4	0.2	
Japanese	15	1 lg.	1.6	0.1	—	7
			*10.9	0.4	0.1	
resh:						
. . . .	115	¼ lb.		17.8	3.5	105
				15.5	3.0	
. . . .	115	¼ lb.		19.7	5.8	135
				17.1	5.0	
. . . .	115	¼ lb.		23.2	3.2	125
				20.2	2.8	
, see Litchi						

M

amia nuts, Hawaiian, in oil and salted . .	30	14	2.4	2.6	23.5	240
			8.2	8.6	78.5	
oni	75	½ c.	55.6	10.1	0.7	275
			74.1	13.4	0.9	
oni, Quaker	75	½ c.	55.1	10.5	0.7	275
			73.5	14.0	0.5	

M

Food items.	Size of portion: Grams.	Household measure.	Value of portion: Carb.	Prot.	Fat
Macaroni, boiled	240	1 c.	37.9	7.2	3.6
			15.8	3.0	1.5
Macaroni and cheese	115	¼ lb.	17.2	8.7	14.7
			*15.0	7.6	12.8
Macaroni in cream sauce, Heinz	240	1 c.	33.4	10.8	3.1
			13.9	4.5	1.3
Macaroons	25	2, 1⅜″ diam.	16.3	1.6	3.8
			65.2	6.5	15.2
Macedoine (mixed vegetables), canned	80	½ c.	3.1	1.1	—
			*3.9	1.4	—
Mackerel:					
Raw	230	½ lb.		43.0	16.3
				18.7	7.1
Cooked	115	¼ lb.	4.2	19.2	7.3
			3.7	16.7	6.4
Fried	115	¼ lb.		23.0	13.0
				20.0	11.3
Canned	100	½ c.		22.6	7.9
				22.6	7.9
Salt	115	¼ lb.		24.3	26.0
				21.1	22.[illegible]
Smoked	115	¼ lb.		27.4	15.0
				23.8	13.0
Malt Breakfast Food . . .	30	¼ c.	22.7	3.2	0.3
			75.8	10.7	1.0
Malted milk, Borden . . .	8	1 T.	5.6	1.2	0.8
			70.1	15.1	9.2
Malted milk, Horlick . . .	8	1 T.	5.4	1.3	0.7
			*68.0	16.4	8.8
Malted milk, Thompson, chocolate	10	1 T	8.2	0.8	0.6
			82.3	7.8	5.8
Maltex Cereal	30	¼ c.	23.0	5.0	0.5
			76.7	16.7	1.7
Mandarinen (tangerines) . .	100	2, 2″ diam.	10.9	0.8	0.3
			10.9	0.8	0.3
Mango, Florida	160	1 av.	19.2	0.3	0.3
			*12.0	0.5	0.5
Manioca starch (tapioca) . .	40	¼ c.	35.2	0.2	Trace
			88.0	0.4	0.1
Maple extract, imitation, Burnett, A.P.	6	1 t.	1.8	0	0
			30.0	0	0
Maple sugar	60	1, 1½″ sq.	49.7	—	—
			*82.8	—	—
Maple syrup	18	1 T.	12.8	—	—
			*71.4	—	—
Margarine	15	1 T.	—	0.1	12.2
			0.4	0.6	81.0
Marmalade, orange	25	1 T.	21.1	0.2	Trace
			84.5	0.6	0.1
Marmite, see *Vegex*.					
Marrow, beef	20	1 T.		0.4	18.6
				2.2	92.8
Marrow, vegetable	100	1 c.	1.4	0.5	0.1
			*1.4	0.5	0.1
Marshmallows	30	5, 1¼″ diam.	24.0	2.0	—
			80.0	6.7	—
Marzipan (almond paste) . .	10	1 t.	1.1	1.3	3.5
			10.9	13.2	34.5

* Largely assimilable. ‡ Gross fat rea

Blank space indicates lack of data. Negligible quantity is designated b

[1] The term "skimmed" is not acceptable.

M

	Size of portion.		Value of portion.			
...d items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
. . . . . .	20	1, 6″ diam.	**14.0**	**3.0**	**—**	70
			70.0	15.0	—	
com.	20	1 T.	**0.4**	**0.3**	**16.0**	150
			2.0	1.4	80.0	
l	30	¼ c.	**20.4**	**4.7**	**1.3**	115
			67.9	15.6	4.4	
. . . . .	15	1 T.	**0**	**0**	**14.7**	135
			0	0	98.1	
y	130	1 c.	**82.2**	**13.7**	**2.9**	420
			66.3	10.5	2.2	
nular	130	1 c.	**98.0**	**12.0**	**2.5**	475
			75.4	9.2	1.9	
. . . . . .	100	¾ c.	**28.0**	**35.9**	**17.5**	390
			28.0	35.9	17.5	
. . . .	130	1 c.	**93.0**	**17.7**	**2.6**	465
			71.5	13.6	2.0	
a	100	1¼ c.	**—**	**36.5**	**17.5**	310
			—	36.5	17.5	
Iillions, see *Multi-Food.*						
abies, see pages 703–709						
ste (chicken, ham, ...	20	1 T.	**0.8**	**3.9**	**2.5**	45
			*4.2	19.7	12.7	
eneral Classification						
ery well done . .	115	¼ lb.		**39.1**	**6.9**	225
				34.0	6.0	
ium done	115	¼ lb.		**34.5**	**6.9**	205
				30.0	6.0	
. . . .	115	¼ lb.		**31.0**	**6.9**	190
				27.0	6.0	
m fat, well done . .	115	¼ lb.		**34.5**	**20.7**	335
				30.0	18.0	
ium done	115	¼ lb.		**31.0**	**20.7**	320
				27.0	18.0	
e	115	¼ lb.		**26.4**	**20.7**	300
				23.0	18.0	
edium done . . .	115	¼ lb.		**25.3**	**34.5**	425
				22.0	30.0	
fat, medium done . .	115	¼ lb.		**19.5**	**51.7**	560
				17.0	45.0	
oast, white bread . .	20	2 sl., 4″ sq.	**15.8**	**2.8**	**0.4**	80
			79.0	14.0	1.8	
awpaw, see Papaya.						
see specific item.						
nd Cream, cow:						
. . . .	240	1 c.	**12.0**	**7.9**	**9.6**	170
			*5.0	3.3	4.0	
. . . .	30	1 oz.	**1.5**	**1.0**	**1.2**	20
			*5.0	3.3	4.0	
(6 oz.)	170	6 oz.	**7.6**	**5.3**	**11.9**	165
			*4.5	3.1	7.0	
. . . .	28	1 oz.	**1.3**	**0.8**	**2.0**	35
			*4.5	3.1	7.0	
,[1] hand	240	1 c.	**11.3**	**8.6**	**1.7**	95
			*4.7	3.6	0.7	
,[1] hand	30	1 oz.	**1.4**	**1.1**	**0.2**	12
			*4.7	3.6	0.7	
,[1] separator	240	1 c.	**12.0**	**8.9**	**0.5**	12
			*5.0	3.7	0.2	
,[1] separator	30	1 oz.	**1.5**	**1.1**	**0.1**	90
			*5.0	3.7	0.2	

M

Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb	Prot	Fat
Milks and Cream, cow:					
Whey	225	1 c.	**11.4**	**2.3**	**0.7**
			*5.0	1.0	[illegible]
Cream, light (20% fat) . .	230	1 c.	**9.2**	**6.9**	**46.0**
			*4.0	3.0	20.0
Cream, light (20% fat) .	27	1 oz.	**1.1**	**0.8**	**5.0**
			*4.0	3.0	20.0
Cream, light (20% fat), sour	15	1 T.	**0.4**	**0.5**	**3.0**
			*3.0	3.1	20.0
Cream, medium (30% fat) .	225	1 c.	**7.9**	**5.9**	**67.0**
			*3.5	2.6	30.0
Cream, medium (30% fat) .	25	1 oz.	**0.9**	**0.6**	**7.5**
			*3.5	2.6	30.0
Cream, whipping (32% fat)	225	1 c.	**7.4**	**5.6**	**72.0**
			*3.3	2.5	32.0
Cream, heavy (40% fat) .	25	1 oz	**0.9**	**0.5**	**10.0**
			*3.0	2.2	40.0
Cream, heavy (40% fat), sour	14	1 T.	**0.4**	**0.3**	**5.6**
			*2.7	2.3	40.0
Cream (32% fat), whipped .	10	1 T.	**0.3**	**0.3**	**3.2**
			*3.3	2.5	32.0
Condensed	25	1 T.	**13.5**	**2.2**	**2.1**
			*54.1	8.8	8.3
Condensed, Eagle Brand, Borden	25	1 T.	**13.4**	**2.0**	**2.2**
			*53.5	8.1	9.0
Condensed, Lion . . .	25	1 T.	**14.0**	**1.9**	**2.0**
			*56.0	7.6	8.1
Evaporated	15	1 T.	**1.5**	**1.0**	**1.2**
			*10.1	6.7	8.2
Evaporated, Borden . .	15	1 T.	**1.4**	**1.0**	**1.2**
			*9.7	6.9	7.9
Evaporated, Carnation . .	15	1 T.	**1.5**	**1.0**	**1.2**
			*9.9	6.8	7.9
Evaporated, Lion . . .	15	1 T.	**1.5**	**1.0**	**1.2**
			*9.9	6.8	7.9
Evaporated, Pet . . .	15	1 T.	**1.5**	**1.1**	**1.2**
			*9.0	7.1	7.9
Evaporated, Van Camp .	15	1 T.	**1.5**	**1.0**	**1.2**
			*10.2	7.7	7.8
Reconstituted	240	1 c.	**12.7**	**7.5**	**8.6**
			*5.3	3.1	3.6
Milks, cultured:					
Acidophilus, Lederle . .	240	1 c.	**7.2**	**8.4**	**8.4**
			*3.0	3.5	3.5
Acidophilus, Walker-Gordon	240	1 c.	**9.1**	**8.2**	**4.8**
			*3.8	3.4	2.0
Buttermilk, skim, com. . .	240	1 c.	**10.8**	**7.9**	**1.0**
			*4.5	3.3	0.4
Buttermilk, whole, com. .	240	1 c.	**10.8**	**7.9**	**9.1**
			*4.5	3.3	3.8
Buttermilk, sour cream .	240	1 c.	**9.4**	**8.0**	**1.2**
			*3.9	3.3	0.5
Buttermilk, sweet cream .	240	1 c.	**10.6**	**8.4**	**1.0**
			*4.4	3.5	0.4
Kephir	100	1 wine glass	**1.6**	**3.1**	**2.0**
			1.6	3.1	2.0
Koumiss	100	1 wine glass	**3.6**	**2.7**	**7.0**
			*3.6	2.7	7.0
Yoghurt	100	1 wine glass	**9.4**	**7.4**	**7.2**
			*9.4	7.4	7.2

* Largely assimilable. ‡ Gross fat rem

Blank space indicates lack of data. Negligible quantity is designated b

[1] The term "skimmed" is not acceptable.

Items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
red:						
d	15	2 T.	5.5	4.3	4.0	75
			*36.5	28.7	26.9	
l	15	2 T.	5.8	5.3	0.3	50
			*38.8	35.4	1.7	
d	8	1 T.	6.0	1.0	—	30
			*74.5	13.0	0.5	
n[1]	7	2 T.	3.2	2.2	0.8	30
			*46.0	32.0	12.0	
le	8	1 T.	3.0	2.1	2.2	40
			*38.0	26.7	28.0	
orden	8	1 T.	5.6	1.2	0.8	35
			70.1	15.1	9.2	
Horlick	8	1 T.	5.4	1.3	0.7	35
			*68.0	16.4	8.8	
hocolate, Thomp-	10	1 T.	8.2	0.8	0.6	40
			82.3	7.8	5.8	
Merrell-Soule	8	1 T.	1.8	3.0	2.2	40
			*23.0	37.0	27.0	
rrell-Soule	8	1 T.	4.0	3.0	0.1	30
			*49.9	37.7	1.4	
ctic acid, Merrell-	8	1 T.	3.8	2.9	0.1	30
			*47.8	36.0	1.0	
lactic acid, Merrell-	8	1 T.	2.6	2.1	2.2	40
			*32.5	26.5	28.0	
ious species:						
	245	1 c.	14.9	4.9	3.7	115
			*6.1	2.0	1.5	
	245	1 c.	11.7	11.7	18.1	265
			*4.8	4.8	7.4	
	235	1 c.	13.1	9.1	6.6	150
			*5.6	3.9	2.8	
)	240	1 c.	10.3	13.0	24.0	240
			*4.3	5.4	10.0	
sheep)	245	1 c.	13.9	14.2	15.9	255
			*4.8	5.8	6.5	
	240	1 c.	9.1	9.6	10.1	170
			*3.8	4.0	4.2	
evaporated, Meyen-	15	1 T.	1.3	1.0	1.0	20
			*8.8	7.0	7.1	
	30	1 oz.	1.9	0.4	0.9	20
			*6.5	1.5	3.3	
	245	1 c.	13.7	9.5	7.8	170
			*5.6	3.9	3.2	
	245	1 c.	14.2	4.9	2.9	105
			*5.8	2.0	1.2	
r	250	1 c.	5.2	25.0	42.7	300
			*2.1	10.0	17.1	
	100		70.5	8.2	4.2	360
			*70.5	8.2	4.2	
at, homemade	115	¼ lb.	36.9	5.5	7.7	245
			32.1	4.8	6.7	
at, com.	115	¼ lb.	69.2	7.7	1.6	330
			60.2	6.7	1.4	
at, Heinz	115	¼ lb.	51.9	3.2	3.3	255
			45.1	2.8	2.9	
	100	1 sl.	42.6	4.7	19.7	375
			*42.6	4.7	19.7	
l	14	1 T.	0	0	0	0
			0	0	0	
act, Burnett, A.P.	5	1 t.	0	0	0	0
			0	0	0	

M

Food items.	Size of portion. Grams.	Household measure.	Value of [illegible] Carb.	Prot.	[illegible]
Minute Tapioca	40	¼ c.	**35.2**	**0.2**	[illegible]
			88.0	0.4	0
Miracle Whip, Kraft	20	1 T.	**1.7**	**0.2**	**10.2**
			8.5	1.2	50.[illegible]
Mock turtle soup, canned, conc.	130	½ c.	**7.8**	**7.5**	**1.[illegible]**
			6.0	5.8	0.[illegible]
Mock turtle soup, canned	240	1 c.	**12.9**	**3.8**	**1.2**
			5.4	1.6	0.[illegible]
Molasses, Br'er Rabbit, Gold Label	190	½ c.	**140.0**	**0.9**	**0**
			73.7	0.5	0
Molasses, Br'er Rabbit, Green Label	190	½ c.	**133.2**	**1.7**	**0**
			70.1	0.9	0
Molasses, Cane:					
Light	25	1 T.	**16.5**	—	—
			*65.0	—	—
Medium	25	1 T.	**15.0**	—	—
			*60.0	—	—
Dark	25	1 T.	**13.8**	—	—
			*55.0	—	—
Molasses cookies	10	1	**7.7**	**0.6**	**0.9**
			76.7	6.4	8.9
Mountain spinach (Orach)	75	1½ c.	**3.5**	**3.3**	**0.3**
			4.7	4.5	0.4
Mozzarella, Italian cheese	30	1 oz.	**0.5**	**8.4**	**7.3**
			*1.8	28.1	24.3
Muffets, Quaker	23	1	**17.5**	**2.6**	**0.3**
			75.6	11.1	1.4
Mulberries, black	75	¾ c.	**6.1**	**1.0**	—
			*8.1	1.3	—
Mulberries, black, white, and red	75	¾ c.	**11.0**	**0.9**	**0.5**
			14.6	1.2	0.6
Mullet, grey	50	2 av.	**0.4**	**7.9**	**3.4**
			0.8	15.8	6.8
Mullet, grey, steamed	50	2 av.		**10.8**	**2.0**
				21.6	4.0
Mullet, red	100	2 av.	**1.3**	**15.7**	**4.7**
			1.3	15.7	4.7
Mullet, red, steamed	100	2 av.		**21.4**	**4.3**
				21.4	4.3
Mulligatawny soup, canned, conc.	150	½ c.	**16.1**	**4.1**	**0.8**
			10.7	2.7	0.5
Multi-purpose Food	30	1 oz.	**10.5**	**12.7**	**1.4**
			35.0	42.3	4.5
Mung beans, solid green seed	100		**59.9**	**23.3**	**1.0**
			59.9	23.3	1.0
Mung beans, sprouts	125	1 c.	**5.0**	**3.6**	**0.4**
			4.0	2.9	0.3
Münster cheese	30	1⅛″ cube	**2.1**	**5.1**	**7.7**
			*6.9	16.9	25.9
Münster cheese, American	30	1⅛″ cube		**6.7**	**9.3**
				22.2	31.0
Mushrooms:					
Fresh	50	½ c. diced	—	—	**0.2**
			6.8	3.5	0.4
Boiled	100	½ c.	—	—	**0.2**
			—	—	0.2
Fried	60	½ c.	—	—	**13.4**
			*0.0	2.2	22.3
Canned, whole	80	½ c.	—	—	**0.2**
			6.2	1.9	0.3

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat rem
Negligible quantity is designated

M

...od items.	Size of portion: Grams.	Household measure.	Value of portion: Carb	Prot	Fat	Cal.
...ancy buttons .	80	½ c.	—	—	0.2	2
			3.2	4.5	0.2	
...liced . .	80	½ c.	—	—	0.2	2
			3.7	4.4	0.2	
... sliced stems and	80	½ c.	—	—	0.2	2
			3.0	3.1	0.2	
. . . .	100		—	—	1.5	14
			64.0	15.5	1.5	
... broth, canned . .	120	½ c.	—	—	0.2	2
			1.2	1.1	0.2	
... soup, cream of, ...	240	1 c.	9.6	5.8	10.6	160
			4.0	2.4	4.4	
...ge	230	½ lb.		46.5	5.6	245
				20.2	2.5	
...n, California . .	200	½, 5″ diam.	14.4	1.2	0.2	65
			*7.2	0.6	0.1	
...n juice	120	½ c.	10.9		—	45
			*9.1		—	
. . . .	230	½ lb.	9.4	20.0	2.5	145
			4.1	8.7	1.1	
...oiled	60	2 oz.	—	10.1	1.2	55
			Trace	16.8	2.0	
...anned	100	½ c.	1.5	18.2	3.3	110
			*1.5	18.2	3.3	
... dry	5	1 t.	—	0.1	—	—
			0.3	2.4	0.3	
... prepared, com. . .	10	1 heaping t.	0.3	0.4	0.7	10
			2.8	4.3	6.5	
...greens .	50	½ c.	2.0	1.2	0.2	15
			4.0	2.3	0.3	
... and cress	20	½ c.	0.2	0.3	—	2
			*0.9	1.6	—	
... fresh:						
..., all analyses . . .	230	½ lb.		33.6	84.6	925
				14.6	36.8	
..., lean	230	½ lb.		40.9	37.5	515
				17.8	16.3	
... medium fat . . .	230	½ lb.		35.0	88.1	965
				15.2	38.3	
...uarter	230	½ lb.		35.9	71.0	810
				15.6	30.9	
. . . . . .	115	¼ lb.		19.4	14.5	210
				16.9	12.6	
...quarter	230	½ lb.		38.4	64.6	780
				16.7	28.1	
...y	115	¼ lb.		19.0	3.5	110
				16.5	3.2	
...ind, lean	230	½ lb.		45.5	28.5	450
				19.8	12.4	
...ind, medium fat . .	230	½ lb.		42.6	41.4	560
				18.5	18.0	
. . . . . .	230	½ lb.	11.6	53.2	20.8	460
			5.0	23.1	9.0	
...ree fat removed . .	230	½ lb.		54.5	42.6	630
				23.7	18.5	
...medium fat	230	½ lb.		36.8	76.1	860
				16.0	33.1	
. . . . .	115	¼ lb.		23.2	3.2	125
				20.2	2.8	
...medium fat	230	½ lb.		38.9	46.6	595
				16.9	24.6	
...ler, lean	230	½ lb.		44.9	29.7	460
				19.5	12.9	

M

Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb.	Prot.	Fat
Mutton, fresh:					
Shoulder, medium fat	230	½ lb		**40.7**	**45.[illegible]**
				17.7	[illegible]
Side	230	½ lb.		**37.3**	**68.3**
				16.2	23.[illegible]
Mutton, cooked:					
‡Boiled, lean	75	1 sl.		**23.2**	**3.4**
				30.8	4.4
Brains, boiled	115	¼ lb.		**13.5**	**7.7**
				11.7	6.7
‡Chop, lean, broiled	100	1 chop		**22.6**	**4.5**
				22.6	4.5
Chop, fried, lean	100	1 chop	**5.7**	**22.8**	**25.2**
			*5.7	22.8	25.2
Chop, fried, med. fat	100	1 chop	**2.6**	**15.4**	**60.1**
			*2.6	15.4	60.1
Chop, grilled, lean	100	1 chop		**26.5**	**17.5**
				26.5	17.5
Chop, grilled, med. fat	100	1 chop		**19.9**	**45.0**
				19.9	45.0
Corned, canned	115	¼ lb.		**33.1**	**26.2**
				28.8	22.8
Heart, roasted	115	¼ lb.		**28.7**	**16.9**
				25.0	14.7
Kidney, fried	115	¼ lb.		**32.2**	**10.5**
				28.0	9.1
Leg, boiled	75	1 sl.		**19.3**	**12.4**
				25.8	16.6
‡Leg, roasted	75	1 sl.		**18.7**	**16.9**
				25.0	22.5
‡Roasted, cold	115	¼ lb.		**33.4**	**30.8**
				29.0	26.8
Scrag and neck, stewed	115	¼ lb.		**27.8**	**28.0**
				24.2	24.4
Tongue, canned	115	¼ lb.		**28.1**	**27.6**
				24.4	24.0
Mutton soup, canned, conc.	140	½ c.	**6.9**	**6.4**	**0.8**
			4.9	4.6	0.6
Mysost cheese, American	30	1 oz.		**2.9**	**0.8**
				9.9	2.8
Mysost cheese (Primost)	30	1 oz.		**4.2**	**10.3**
				14.0	34.5

N

Navy beans. See Beans, baked.

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat
Nectarines	125	1, 2″ diam.	**15.5**	**1.1**	—
			*12.4	0.9	—
Nettle, leafy shoots	100		**7.1**	**5.5**	**0.7**
			*7.1	5.5	0.7
Neufchâtel cheese	30	2 T.	**0.5**	**5.6**	**8.2**
			*1.5	18.7	27.4
Neufchâtel cheese, American	30	2 T.	**0.8**	**6.4**	**5.4**
			*2.9	21.3	18.2
Noekkelost cheese, Scandinavian	30	1 oz.	**2.1**	**9.2**	**4.9**
			*7.0	30.6	16.3
Noodles, raw	60	½ c.	**45.4**	**7.0**	**0.6**
			75.6	11.7	1.0
Noodles, egg, Quaker	60	½ c.	**43.3**	**7.1**	**2.2**
			72.2	11.9	3.6

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat re
Negligible quantity is designated

N

…d items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
…e	15	1 T.	—	0.2	12.7	120
			—	1.4	84.8	
	30	20	1.3	6.1	16.0	175
			*4.3	20.5	53.5	
	20	⅓ c.	2.6	4.4	11.5	135
			13.2	21.9	57.4	
	30	4	1.2	4.1	18.4	195
			*4.1	13.8	61.5	
…s	20	12	0.7	5.6	12.2	140
			3.5	27.9	61.2	
…ut kernels, fried in …t oil	15	8	2.0	4.3	7.9	100
			13.4	28.7	52.4	
…s, fresh	50	8	18.3	1.2	1.3	90
			*36.6	2.3	2.7	
…s, dried	35	8	26.0	3.7	2.5	185
			74.2	10.7	7.0	
…s, roasted	50	20	17.7	2.6	2.3	240
			35.4	5.2	4.5	
…t, fresh	50	2½″ sq.	14.0	2.9	25.0	300
			27.9	5.7	50.6	
…t, canned moist	90	1 c.	27.0	4.0	37.3	485
			*30.0	4.4	41.4	
…t, desiccated	45	⅔ c.	17.1	1.9	18.5	250
			*38.1	4.3	41.0	
(hazelnuts), raw, …ed	35	20	3.3	5.2	23.0	250
			*9.3	14.9	65.6	
(hazelnuts), roasted, …	35	20	4.4	4.9	23.3	255
			*12.6	14.1	66.6	
	35	⅓ c.	4.0	5.4	23.6	260
			11.4	15.4	67.4	
	100		45.4	4.9	1.3	220
			*45.4	4.9	1.3	
See Fruits, dried.						
…amia, Hawaiian, fried … and salted	30	14	2.4	2.6	23.5	240
			8.2	8.6	78.5	
…s	60	⅓ c. or 30	5.1	16.9	29.4	360
			*8.6	28.1	49.0	
… butter	15	1 T.	2.6	4.4	7.0	95
			17.1	29.3	46.5	
…t butter com.	15	1 T.	1.7	3.8	7.5	90
			11.0	25.0	50.0	
…s	25	6 (whole)	1.0	2.4	18.2	185
			*3.9	9.4	73.0	
…ias	10	1 T.	0.7	3.4	4.9	60
			*6.9	33.9	49.4	
(pignoiias)	10	1 T.	0.7	3.4	4.9	60
			*6.9	33.9	49.4	
(piniones)	10	1 T.	2.6	0.6	6.1	70
			*26.2	6.5	60.7	
(sabine…)	10	1 T.	0.8	2.8	5.4	65
			*8.4	28.1	53.7	
…	10	1 T.	1.7	1.5	6.2	70
			*17.3	14.6	61.9	
…hios	20	⅓ c.	3.3	4.5	10.8	130
			16.3	22.3	54.0	
…ts, California or Eng…	35	6 (whole)	1.8	4.4	18.0	195
			*5.0	12.5	51.5	

O

Food items.	Size of portion. Grams.	Household measure.	Value of po[illegible] Carb.	Prot.	Fat
Nuts:					
Walnuts, black	35	6 (whole)	**4.1**	**9.7**	**19.7**
			11.7	27.6	[illegible]
Walnuts, soft-shelled	35	6 (whole)	**4.7**	**5.8**	**22.2**
			13.5	16.6	[illegible]

O

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat
Oatmeal	20	¼ c.	**13.5**	**3.2**	**1.4**
			67.5	16.1	7.2
Oats:					
Crushed, Grandmother's	30	¼ c.	**19.6**	**4.5**	**2.0**
			65.4	14.9	6.5
Mother's, Quaker, Quick Quaker and Quick Mother's	30	¼ c.	**19.2**	**5.3**	**1.8**
			64.0	17.8	6.[illegible]
Rolled	30	¼ c.	**19.9**	**5.0**	**2.2**
			66.3	16.7	7.3
Rolled, cooked,	100	½ c. sc.	**15.5**	**4.0**	**1.0**
			15.5	4.0	1.0
Rolled, Purity	30	¼ c.	**18.5**	**5.0**	**2.0**
			61.6	16.3	6.1
Oca, tubers	100		**14.7**	**1.4**	**0.2**
			*14.7	1.4	0.2
Oils and Fats:					
Butter	10	1″ x 1″ x ½″	**—**	**0.1**	**8.5**
			—	1.0	85.0
Cod-liver	14	1 T.	**0**	**0**	**14.0**
			0	0	100.0
Corn	14	1 T.	**0**	**0**	**14.0**
					100.0
Cottolene	11	1 T.	**0**	**0**	**11.0**
					100.0
Cotton-seed	11	1 T.	**0**	**0**	**11.0**
					100.0
Crisco	12	1 T.	**—**	**—**	**12.0**
			—	—	100.0
Lard, refined	15	1 T.	**0**	**0**	**15.0**
			0	0	100.0
Lard, unrefined	15	1 T.	**—**	**0.3**	**14.1**
			—	2.2	94.0
Margarine	15	1 T.	**—**	**0.1**	**12.2**
			0.4	0.6	81.0
Mazola	15	1 T.	**0**	**0**	**14.7**
			0	0	98.1
Mineral	14	1 T.	**0**	**0**	**0**
			0	0	0
Oleomargarine	15	1 T.	**—**	**0.1**	**12.3**
			0.5	0.9	82.0
Olive	14	1 T.	**0**	**0**	**14.0**
			0	0	100.0
Peanut	14	1 T.	**—**	**—**	**14.0**
			—	—	100.0
Pork fat, salt	15	½ oz.		**0.3**	**12.9**
				1.9	86.2
Suet, beef	10	1 T.		**0.5**	**8.2**
				4.7	81.8
Wesson oil	10	1 T.		**—**	**10.0**
				Trace	99.7
Okra	50	7, 2½″ pod	**2.0**	**0.8**	**0.1**
			*4.0	1.6	0.2

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat re[illegible]
Negligible quantity is designated [illegible]

	Size of portion.		Value of portion.			
od items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
. . . .	100	½ c. (5 pods)	**3.0** 3.0	**1.0** 1.0	**0.1** 0.1	15
l	65	⅓ c.	**1.9** *2.9	**0.5** 0.7	Trace 0 1	10
ne	15	1 T.	**—** 0.5	**0.1** 0.9	**12.3** 82.0	115
. . . . .	15	1 T.	**2.8** 18.6	**0.2** 1.5	**3.4** 22.6	45
. . . .	14	1 T.	**0** 0	**0** 0	**14.0** 100.0	130
. . . .	15	5	**—** *0.0	**0.1** 0.9	**1.6** 11.0	15
la, green, bottled .	15	5	**1.5** 10.0	**0.2** 1.0	**3.0** 20.0	35
reen, bottled . .	15	3	**1.5** 10.0	**0.2** 1.0	**2.1** 13 5	25
. . . .	20	5, 1″ long	**0.8** 4.3	**0.3** 1.7	**5.0** 25.0	50
nned or bottled .	14	3	**0.6** 4.0	**0.2** 1.5	**2.4** 17.0	25
. . . .	100		**—** —	**7.6** 7.6	**30.3** 30.3	315
cheese	100		**—** Trace	**17.8** 17.8	**30.9** 30 9	360
jelly	100		**55.4** *55 4	**4.8** 4 8	**19.0** 19.0	425
xtract, imitation , A.P.	5	1 t.	**0** 0	**0** 0	**0** 0	0
kle, sour, com. . .	10	2	**0.1** 1.0	**—** 0.2	**—** Trace	0
kle, sweet, com. .	10	2 c.	**3.7** 37.0	**—** 0.1	**—** Trace	15
up, com.	250	1 c.	**7.5** 3.0	**4.7** 1.9	**6.0** 2.4	105
up, cream of, com. .	240	1 c.	**11.3** 4.7	**4.1** 1.7	**5.0** 2.1	110
, seasoning	35	1 onion	**2.9** *8.3			12
. . . .	75	5 sm.	**2.0** *2.7	**0.4** 0.6	**—** —	10
. . . .	60	½ c	**6.1** *10.1	**1.1** 1.8	**20.0** 33.3	215
. . . .	25	5 sm.	**2.1** *8.5	**0.2** 1.0	Trace 0.1	10
kin, large	200	1 onion	**14.4** *7.2			60
sh (large, yellow jack-	300	1 onion	**11.6** *3.9			50
ish[2]	565	1 onion[3]	**8.1** *8.5			35
h	100		**6.3** *6.3	**2.2** 2.2	**0.6** 0.6	40
e, med.	50	1, 2″ diam.	**4.0** *8.0	**0.8** 1.6	**0.2** 0.3	20
e, sm.	15	1 onion	**1.0** *7.0			4
e, boiled	15.2	1 onion	**1.0** *6.9			4

 to season.
ason.

[3] Serving: 2 slices, 95 grams.

O

Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb.	Prot.	Fa...
Opihi, Australian limpet	115	¼ lb.		3.2	1.4
				2.8	[illegible]
Opossum	115	¼ lb.		14.9	46.0
				13.0	[illegible]
Orach (mountain spinach)	75	1½ c.	2.8	3.3	0.3
			*3.7	4.5	0.4
Orach, Peruvian, see Quinoa.					
Oranges	100	1 sm.	8.5	0.8	0.2
			*8.5	0.8	0.[illegible]
Canned	135	¾ c.	19.9	1.1	0.3
			15.5	0.8	0.2
Mandarin type (loose-skinned)	100	2, 2″ diam.	10.9	0.8	0.3
			10.9	0.8	0.3
Satsuma	100	2, 2″ diam.	8.7	0.8	0.3
			*8.7	0.8	0.3
Seville	100	1 sm.	11.4	0.8	0.2
			11.4	0.8	0.2
Orange:					
Extract, Burnett, A.P.	5	1 t.	0	0	0
			0	0	0
Juice, California	120	½ c.	15.7	0.7	—
			13.1	0.6	—
Juice, Florida	120	½ c.	11.3	0.7	—
			*9.4	0.6	—
Juice, Mandarin type	120	½ c.	10.0	1.1	0.4
			9.2	0.9	0.3
Juice, canned	120	½ c.	10.8	0.7	0.1
			*9.0	0.6	0.1
Marmalade, com.	25	1 T.	17.5	0.1	—
			*69.9	0.3	Trace
Peel, candied	10	1 sm. piece	8.1	—	—
			80.6	0.4	0.3
Ovaltine, A.P.	9	1 T.	4.3	0.9	4.4
			72.1	14.3	7.4
Oxo (cubes)	5		0	1.6	0.2
			0	31.9	3.8
Oxo (extract)	10	1 heaping t.	0.1	1.6	0
			1.0	16.0	0
Oxtail soup, canned, conc.	140	½ c.	11.9	5.5	2.4
			8.5	3.9	1.7
Oysters:					
"Lynnhaven" (lg.)	135	6 (⅔ c.)	5.0	8.3	1.6
			3.7	6.2	1.2
"Cape Cod" (med.)	110	6 (½ c.)	4.0	6.8	1.3
			3.7	6.2	1.2
"Blue Point" (sm.)	100	6	3.7	6.2	1.2
			3.7	6.2	1.2
Canned	60	½ c.	2.3	5.3	1.4
			3.9	8.8	2.4
Solids	120	½ c.	4.0	7.2	1.6
			3.3	6.0	1.3
Oyster soup, cream of, canned	240	1 c.	10.5	3.6	4.1
			4.4	1.5	1.7
Oyster plant (salsify)	100	2, 6″ long	15.5	3.5	1.0
			15.5	3.5	1.0
Oyster plant, cooked	80	½ c	7.2	0.9	Trace
			9.0	1.2	0.1

P

Pai-tsai, Chinese cabbage	110	1 c.	2.6	1.5	0.1
			2.4	1.4	0.1

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat resi...
Negligible quantity is designated b...

P

ood items.	Size of portion: Grams.	Size of portion: Household measure.	Value of portion: Carb.	Value of portion: Prot.	Value of portion: Fat.	Cal.
e Chinese cabbage.						
uds, see Palmetto						
abbage	100	¾ c.	**6.1**	**3.3**	**0.6**	**45**
			6.1	3.3	0.6	
abbage, cooked .	100	½ c.	**5.6**	**2.9**	**0.5**	**40**
			5.6	2.9	0.5	
ur. see Flours.						
. . . .	50	3	**18.2**	**2.5**	**7.5**	**155**
			*36.4	5.1	15.1	
fresh:						
in	100	2		**14.9**	**17.0**	**220**
				14.9	17.0	
im	100	2		**13.5**	**25.0**	**290**
				13.5	25.0	
. . . .	100	2		**12.8**	**29.0**	**320**
				12.8	29.0	
fat	100	2		**11.8**	**34.0**	**365**
				11.8	34.0	
. . . .	100			**19.2**	**8.8**	**160**
				19.2	8.8	
. . . .	100			**14.5**	**23.8**	**280**
				14.5	23.8	
ropical, see Papaya.						
. . . .	50	1, 4″ long	**8.4**	**2.6**	**0.4**	**50**
			16.8	5.2	0.9	
melon pawpaw) . .	100	¼, 5″ diam.	**10.0**	**0.6**	**0.1**	**45**
			10.0	0.6	0.1	
Florida	120	$\frac{1}{10}$ av.	**6.9**	**0.4**	**0.6**	**35**
			*5.8	0.3	0.5	
n cheese	5	2 t. grated		**2.2**	**1.0**	**20**
				43.5	19.1	
n cheese, Formaggio .	5	2 t.		**2.5**	**1.1**	**20**
				49.4	22.7	
n cheese, Reggiano .	5	2 t.		**1.7**	**1.4**	**20**
				34.8	27.3	
eaves	1	1 t.	**0.1**	Trace	Trace	—
			9.0	3.7	1.0	
oots, Hamburg . .	100		**8.1**	**2.1**	**0.2**	**45**
			8.1	2.1	0.2	
leaves	25	½ c.	**1.6**	**0.5**	—	**9**
			6.3	2.0	—	
. . . .	120	¾ c., diced	**13.2**	**1.8**	**0.6**	**70**
			*11.0	1.5	0.5	
, boiled	80	½ c.	**8.0**	**1.0**	**0.3**	**40**
			*10.0	1.3	0.4	
e, roast	115	¼ lb.		**40.5**	**8.3**	**245**
				35.2	7.2	
ruit	50	2 med.	**3.1**	**1.4**	—	**20**
			*6.2	2.8	—	
ruit juice, natural .	30	1 oz.	**3.5**	**0.4**	—	**15**
			*11.5	1.4	—	
fruit juice, purple or lilla	30	1 oz.	**5.7**	**0.2**	—	**25**
			19.1	0.6	—	
ruit beverage . . .	240	1 c.	**33.5**	**0.2**	—	**140**
			*14.0	0.1	—	
laky, baked	25		**10.9**	**1.5**	**8.9**	**135**
			*43.5	5.9	35.8	
hort, baked	25		**13.7**	**1.8**	**7.6**	**135**
			*54.8	7.3	30.4	
foie gras	6	1 t.	**0.3**	**0.7**	**2.6**	**30**
			4.8	11.4	43.8	

P

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat
Patience dock	25	½ c.	8.0	1.0	[illegible]
			*10.0	1.3	[illegible]
Pea meal	100	¾ c.	28.0	35.9	17.5
			28.0	35.9	17.5
Pea soup, canned, conc.	140	½ c	17.4	6.7	2.2
			12.4	4.8	[illegible]
Pea soup, cream of, canned	240	1 c.	15.4	4.8	8.6
			6.4	2.0	[illegible]
Peaches:	150	2, 2″ diam.	13.2	0.8	0.2
			*8.8	0.5	[illegible]
Georgia	150	1 lg.	14.1		
			*9.4		
Maryland	150	1 lg.	12.9		
			*8.6		
North Carolina	150	1 lg.	13.8		
			*9.2		
New Jersey	150	1 lg.	11.4		
			*7.6		
Peaches, canned, water pack	140	2 halves	6.4	0.7	0.1
			*4.6	0.5	[illegible]
Peaches, canned, juice pack	140	2 halves	10.2	0.6	0.3
			*7.3	0.4	[illegible]
Peaches, canned, in syrup	140	2 halves	25.5	0.6	0.1
			18.2	0.4	0.1
Peaches, canned, also see Fruits, canned					
Peaches, dried	50	3, 1¾″ diam.	26.5	1.7	—
			*53.0	3.4	—
Peach jam	25	1 T.	16.2	0.2	—
			57.0	0.7	Trace
Peach juice	120	½ c.	15.4	0.2	—
			12.8	0.2	—
Peanuts	60	30	5.1	16.9	29.4
			*8.6	28.1	49.0
Peanut:					
Brittle	15	1½″ x 3″	10.1	1.8	2.7
			67.0	12.0	18.0
Butter	15	1 T.	2.6	4.4	7.0
			17.1	29.3	46.5
Butter, com.	15	1 T.	1.7	3.8	7.5
			11.0	25.0	50.0
Cookies	10	1	5.4	1.4	2.8
			53.5	14.0	27.5
Flour	100	1¼ c.	36.5	51.2	5.0
			36.5	51.2	5.0
Meal	100	1¼ c.	6.7	51.6	10.5
			*6.7	51.6	10.5
Meal, high grade	100	1¼ c.	21.7	50.9	7.5
			21.7	50.9	7.5
Meal, med. grade	100	1¼ c.	23.0	44.9	8.8
			23.0	44.9	8.8
Oil	115	½ c.	—	—	115.0
			—	—	100.0
Pears:					
Bartlett	150	1, 3″ long	12.5	0.6	0.6
			*8.3	0.4	0.4
Canned, water pack	120	2 halves	4.9	0.4	0.1
			*4.1	0.3	0.1
Canned, juice pack	120	2 halves	9.6	0.2	0.1
			*8.0	0.2	0.1
Canned, in syrup	120	2 halves	22.1	0.2	0.1
			18.4	0.2	0.1

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat re...
Negligible quantity is designated b...

P

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal
see also Fruits						
l.						
. . . .	30	1 oz.	**22.8**	**0.4**	**0.2**	95
			75.9	1.3	0.6	
. . . .	75	4 halves	**27.0**	**1.7**	**0.3**	120
			*36.0	2.3	0.4	
. . . .	100	1 av.	**10.4**	**0.8**	—	45
			10.4	0.8	—	
. . . .	25	1 T.	**14.0**	**0.2**	—	60
			56.0	0.7	Trace	
k-eye, see Cowpeas						
ery young . . .	75	½ c.	**7.5**	**4.2**	**0.2**	40
			10.0	5.5	0.3	
av.	75	½ c.	**8.0**	**4.3**	**0.4**	55
			*10.6	5.8	0.5	
ery old	75	½ c.	**19.5**	**6.0**	**0.3**	105
			26.0	8.0	0.4	
ooked	70	½ c.	**5.4**	**3.5**	—	35
			*7.7	5.0	—	
fat	80	½ c.	**8.8**	**5.3**	—	60
			11.0	6.7	—	
pois"	75	½ c.	**5.2**	**2.5**	—	30
			7.0	3.4	—	
oung, canned . .	70	½ c.	**6.0**	**2.5**	**0.1**	35
			*8.6	3.6	0.2	
canned	70	½ c.	**7.8**	**3.2**	**0.1**	55
			11.2	4.6	0.2	
. . . .	100	⅓ c.	**57.5**	**24.6**	**1.0**	345
			*57.5	24.6	1.0	
boiled	120	½ c.	**22.9**	**8.3**	—	130
			*19.1	6.9	—	
oiled	120	½ c.	**26.3**	**10.0**	—	150
			*21.9	8.3	—	
. . . .	25	6 (whole)	**1.9**	**2.4**	**18.2**	185
			*3.9	9.4	73.0	
logg	30	¾ c.	**23.1**	**3.7**	**0.6**	115
			77.1	12.2	1.9	
:						
, sweet	25	3" piece	**1.0**	**0.2**	Trace	5
			4.1	0.8	0.1	
, dried	5	1 t.	**3.1**	**0.8**	**0.4**	20
			63.0	15.5	8.5	
olitan	25	3" piece	**1.4**	**0.3**	**0.1**	8
			5.7	1.1	0.3	
fresh	25	3" piece	**2.0**	**0.3**	**0.2**	11
			8.1	1.3	0.7	
dried	5	1 t.	**3.5**	**0.5**	**0.4**	20
			70.0	9.4	7.7	
pot soup, canned, conc.	140	½ c.	**11.5**	**6.4**	**4.2**	115
			8.2	4.6	3.0	
pot soup, canned . .	240	1 c.	**12.0**	**5.5**	**3.1**	100
			5.0	2.3	1.3	
white	100			**19.3**	**4.0**	115
				19.3	4.0	
yellow	100			**18.7**	**0.8**	85
				18.7	0 8	
mons, American . .	50	1 sm.	**9.5**	**0.4**	**0.2**	40
			*18.9	0.8	0.4	
mons, Japanese . .	100	1 lg.	**15.9**	**0.8**	**0.4**	70
			*15.9	0.8	0.4	
k, evaporated . . .	15	1 T.	**1.5**	**1.1**	**1.2**	20
			*9.8	7.1	7.9	
hn's, Quaker . . .	20	2 T.	**14.7**	**2.0**	**0.4**	70
			73.3	10.1	1.9	

P

Food items.	Size of portion. Grams.	Household measure.	Value of Carb.	Prot.	Fat
Petty rice, see Quinoa.					
Pheasant	230	½ lb.		**56.1**	**11.0**
				24.4	[illegible]
Pheasant, roasted	115	¼ lb.		**35.4**	**10.7**
				30.8	9.3
Pickerel (pike)	230	½ lb.		**43.0**	**1.2**
				18.7	0.5
Pickled tripe	115	¼ lb.		**23.6**	**2.3**
				20.5	2.0
Pickles:					
Cucumber, fresh, com.	20	3 sl.	**3.2**	**0.2**	—
			15.9	1.2	0.2
Dill	50	1 med.	**1.4**	**0.2**	**0.1**
			2.7	0.5	0.3
Mixed, chopped	20	1 T.	**0.8**	**0.2**	—
			4.0	1.1	0.4
Onions, sour, com.	10	2	**0.1**	—	—
			1.0	0.2	Trace
Onions, sweet, com.	10	2	**3.7**	—	—
			37.0	0.1	Trace
Sour, chopped, com.	20	1 T.	—	**0.1**	**0.1**
			Trace	0.5	0.3
Sweet, chopped, com.	20	1 T.	**7.2**	**0.1**	**0.1**
			36.0	0.5	0.3
Sweet, mustard, chopped, com.	25	1 T.	**6.3**	—	**0.2**
			25.0	Trace	0.8
Pidan (Chinese preserved egg)	100	1 lg.	—	**26.8**	**18.5**
			—	26.8	18.5
Pies:					
Apple	100	1 sl.	**32.6**	**2.3**	**8.7**
			*32.6	2.3	8.7
Custard	100	1 sl.	**27.7**	**5.5**	**14.4**
			*27.7	5.5	14.4
Gooseberry	100	1 sl.	**31.0**	**2.8**	**9.4**
			*31.0	2.8	9.4
Mince	100	1 sl.	**42.6**	**4.7**	**19.7**
			*42.6	4.7	19.7
Rhubarb	100	1 sl.	**29.8**	**2.6**	**9.4**
			*29.8	2.6	9.4
Pigeon, red meat	20	1 av.	**0.2**	**3.6**	**1.2**
			1.2	17.9	6.2
Pigeon, white meat	80	1 av.	**0.2**	**12.0**	**4.2**
			0.3	17.5	5.2
Pigeon, whole	180	1 av.	**0.5**	**33.4**	**22.5**
			0.3	18.5	12.5
Pigeon, roasted	80	1 lg.		**21.4**	**10.6**
				26.8	13.2
Pigeon, see also Squab.					
Pignolias	10	1 T.	**0.7**	**3.4**	**4.9**
			*6.9	33.9	49.4
Pig's blood, prepared, Chinese	100			**9.7**	**1.1**
				9.7	1.1
Pig's feet, boiled	115	¼ lb.	**0.7**	**16.6**	**12.1**
			0.6	14.4	10.5
Pig's feet, pickled	115	¼ lb.		**18.7**	**17.0**
				16.3	14.8
Pike (pickerel)	230	½ lb.		**43.0**	**1.2**
				18.7	0.5
Pilchard	50	3 av.	**0.6**	**7.6**	**2.7**
			1.3	15.3	5.2
Pilchard, canned	50	3 av.		**8.0**	**7.5**
				16.0	15.0

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat rem
Negligible quantity is designated b

P

od items.	Size of portion.		Value of portion.			
	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
. . . .	25	1 cracker	18.6	2.8	1.3	100
			74.2	11.1	5.0	
eddar) cheese .	20	1 cu. in.		3.2	6.4	75
				16.0	32.2	
ese, Kraft . .	30	⅛" sl. 5# loaf		6.6	9.1	110
				22.0	30.5	
anned	11	1 t.	0.8	0.1	Trace	4
			6.8	0.9	0.3	
ignolias) . . .	10	1 T.	0.7	3.4	4.9	60
			*6.9	33.9	49.4	
iniones) . . .	10	1 T.	2.6	0.6	6.0	70
			*26.2	6.5	60.7	
sabine)	10	1 T.	0.8	2.8	5.4	65
			*8.4	28.1	53.7	
. . . .	150	1 c. diced	13.9	0.6	0.5	65
			*9.3	0.4	0.3	
water pack . .	150	2 sl.	15.2	0.4	0.1	65
			*10.1	0.3	0.1	
juice pack . .	150	2 sl.	18.8	0.6	0.1	80
			*12.5	0.4	0.1	
in syrup . . .	150	2 sl.	27.9	0.6	0.1	120
			*18.6	0.4	0.1	
see also Fruits, d.						
. . . .	50	1 sl.	40.0	0.4	0.2	165
			80.0	0.8	0.4	
, Burnett, A.P. . .	6	1 t.	2.8	0	0	12
			47.0	0	0	
. . . .	120	½ c.	15.4	0.4	0.4	70
			12.8	0.3	0.3	
atural, canned, aiian	120	½ c.	15.9	0.4	0.4	70
			*13.3	0.3	0.3	
. . . .	10	1 T.	1.7	1.5	6.2	70
			*17.3	14.6	61.9	
banana flour . .	100	⅔ c.	72.5	3.5	0.8	320
			72.5	3.5	0.8	
s	20	¼ c.	3.3	4.5	10.8	130
			16.3	22.3	54.0	
extract, imitation, t, A.P.	5	1 t.	0	0	0	0
			0	0	0	
ed	115	¼ lb.	8.0	20.7	16.6	270
			*7.0	18.0	14.4	
eamed	115	¼ lb.		20.8	2.2	105
				18.1	1.9	
(baking banana) .	100		32.0	1.5	0.4	140
			32.0	1.5	0.4	
. . . .	50	2, 2½" long	4.2	0.4	0.1	20
			*8.3	0.7	0.2	
l, water pack . .	100	3, ½ c.	4.5	0.4	0.1	20
			*4.5	0.4	0.1	
l, in syrup . . .	100	3, ½ c.	20.4	0.4	0.1	115
			20.4	0.4	0.1	
l, see also Fruits, ed.						
n	50	4 med.	4.8	0.2	—	20
			*9.6	0.5	—	
age	50	3 med.	5.9	0.4	—	25
			*11.8	0.8	—	
fresh	50	2 med.	6.7	0.5	0.1	30
			*13.3	0.9	0.2	
see also Prunes.						
se, red, pickled . .	100		4.9	0.5	1.3	35
			4.9	0.5	1.3	

P

Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb.	Prot.	Fat
Plum jam	25	1 T.	**12.2**	**0.3**	**—**
			49.0	1.1	Trace
Plum pudding, canned	90	3 oz.	**29.7**	**4.1**	**12.6**
			33.0	4.5	[illegible]
Plum pudding, English, canned	90	3 oz.	**46.9**	**3.9**	**7.3**
			52.1	4.3	[illegible]
Plum pudding, Heinz	90	3 oz.	**42.2**	**3.8**	**9.3**
			46.9	4.2	10.3
Poi, Hawaiian[1]	230	1 c.	**34.5**	**2.1**	**0.2**
			15.0	0.9	0.1
Poi, Hawaiian[2]	100		**28.6**	**0.3**	**0.1**
			*28.6	0.3	0.1
Poi, Hawaiian, sour	100		**9.8**		
			*9.8		
Pokeberry	100		**3.7**	**2.6**	**0.4**
			3.7	2.6	0.4
Pollack	230	½ lb.		**49.7**	**1.8**
				21.6	0.8
Pollack, fried	115	¼ lb.	**7.6**	**19.0**	**7.9**
			*6.6	16.5	6.9
Pollack, steamed	115	¼ lb.		**22.4**	**0.9**
				19.5	0.8
Pomegranates	155	½, 6½″ diam.	**26.0**	**2.3**	**2.5**
			*16.8	1.5	1.6
Pomegranates, Florida	250	1 av.	**17.8**	**1.2**	**2.2**
			*7.1	0.5	0.9
Pomegranate juice	120	½ c.	**13.9**	**0.2**	**—**
			*11.6	0.2	—
Pompano	230	½ lb.		**43.2**	**17.3**
				18.8	7.5
Pont l'Evêque cheese	20	1½″ x 1″ x ½″	**1.3**	**4.1**	**5.0**
			*6.7	20.3	25.0
Pont l'Evêque cheese, American	20	1½″ x 1″ x ½″		**5.0**	**5.9**
				25.2	29.3
Pop corn, popped	15	1 c.	**11.8**	**1.6**	**0.8**
			78.7	10.7	5.0
Porgy	230	½ lb.		**42.8**	**11.7**
				18.6	5.1
Pork, fresh:					
Brains	115	¼ lb		**13.5**	**11.9**
				11.7	10.3
Chops, loin, lean	230	½ lb.		**46.7**	**43.7**
				20.3	19.0
Chops, loin, medium	230	2, ½ lb.		**38.2**	**69.2**
				16.6	30.1
Chuck ribs and shoulder	230	½ lb.		**39.8**	**71.5**
				17.3	31.1
Ham, lean	230	½ lb.		**57.5**	**33.1**
				25.0	14.4
Ham, medium	230	½ lb		**35.2**	**66.5**
				15.3	28.9
Heart	115	¼ lb.		**19.7**	**7.2**
				17.1	6.3
Kidney	115	¼ lb.	**0.8**	**17.8**	**5.6**
			0.7	15.5	4.8
Liver	230	½ lb.	**3.2**	**49.2**	**10.4**
			1.4	21.4	4.5
Lungs	115	¼ lb.		**13.7**	**4.6**
				11.9	4.0
Middle cuts	230	½ lb.		**36.1**	**83.5**
				15.7	36.3

[1] 83 per cent water, as eaten.
[2] 69 per cent water, as p
* Largely assimilable.
‡ Gross fat
Blank space indicates lack of data.
Negligible quantity is design

P

d items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
. . . . . .	230	½ lb.		20.9 9.1	127.2 55.3	1270
. . . . . .	230	½ lb.		30.6 13.3	87.7 34.2	940
. . . .	230	½ lb.		43.5 18.9	29.9 13.0	455
d:						
ack, pea-mealed, n, fried . . .	60	⅛ lb.		16.2 27.1	2.8 4.6	90
reakfast, broiled	20	4 str., 7″ long (raw)		7.2 35.8	9.1 45.6	115
roiled	115	¼ lb.		32.9 28.6	8.3 7.2	215
lled, lean	100	1 chop		25.3 25.3	23.7 23.7	325
illed, med. fat . .	100	1 chop		18.6 18.6	50.3 50.3	545
aked or boiled . .	115	¼ lb.		30.3 26.4	5.7 4.9	175
roiled	115	¼ lb.		33.0 28.7	5.0 4.3	180
viled	20	1 T.		3.8 19.0	6.8 34.1	80
noked, parboiled and	115	¼ lb.		32.2 28.0	4.4 3.8	175
asted	115	¼ lb.		38.4 33.4	5.2 4.5	205
asted, med. fat . .	115	¼ lb.		28.3 24.6	26.7 23.2	365
roasted	115	¼ lb.		34.1 29.7	6.4 5.6	200
asted, lean . . .	115	¼ lb.		27.1 23.6	23.1 20.1	325
asted, med. fat . .	115	¼ lb.		22.4 19.5	46.5 40.4	525
smoked, lean, cooked	115	¼ lb.		27.3 23.7	18.1 15.7	280
et, boiled . . .	115	¼ lb.	0.7 0.6	16.6 14.4	12.1 10.5	185
d, cold	115	¼ lb.		37.5 32.6	22.6 19.7	365
e, fried	60	2 oz.	7.6 *12.7	6.9 11.5	14.9 24.8	200
ch, cooked . . .	115	¼ lb.	0 0	19.0 16.5	10.4 9.0	175
iscellaneous:						
. smoked	80	4 str. 8½″ long		8.4 10.5	51.8 64.8	515
alted backs . . .	115	¼ lb.		8.9 7.7	83.6 72.7	815
alted bellies . . .	115	¼ lb.		9.7 8.4	83.0 72.2	810
alt	60	2 oz.		1.0 1.9	51.7 86.2	480
smoked, lean . . .	230	½ lb.		45.5 19.8	47.8 20.9	630
smoked, medium fat .	230	½ lb.		37.5 16.3	89.2 38.8	995
l cheese . .	200	1, ⅜″ sl.	— —	39.0 19.5	67.6 33.8	790

P

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat
Pork, miscellaneous:					
Pig's feet, pickled	115	¼ lb.		**18.7**	**17.0**
				16.3	14.[illegible]
Pig's tongue, pickled	115	¼ lb.		**20.4**	**22.8**
				17.7	19.8
Sausage	35	2, 3½″ long	**0.4**	**4.5**	**15.5**
			1.1	13.0	44.2
Sausage, Arles	115	¼ lb.		**30.8**	**58.2**
				26.8	50.6
Sausage (pork and beef)	60	⅛ lb.		**11.6**	**14.5**
				19.4	24.1
Shoulder, smoked, medium fat	230	½ lb.		**36.6**	**74.8**
				15.9	32.5
Port du Salut cheese	25	1½″ x 1″ x ¾″		**5.3**	**6.3**
				21.2	25.2
Postum Cereal	2	1 t.	**1.4**	**0.3**	**0.1**
			68.8	12.3	2.7
Postum, Instant	2	1 t.	**1.7**	**0.1**	**0**
			82.3	6.6	0
Potatoes:					
Sweet	150	1, 6″ x 1¾″	**39.2**	**2.7**	**1.1**
			*26.1	1.8	0.7
Sweet, baked	100	½ lg.	**32.2**	**2.1**	**0.8**
			32.2	2.1	0.8
Sweet, boiled	100	1 med.	**20.1**	**1.1**	**0.5**
			*20.1	1.1	0.5
Sweet, canned	75	2 sm.	**31.1**	**1.4**	**0.3**
			41.4	1.9	0.4
White	100	1 med.	**18.0**	**2.2**	**0.1**
			*18.0	2.2	0.1
White, baked	150	1 med.	**38.1**	**4.6**	**0.1**
			25.4	3.1	0.1
White, new, boiled	100	3 sm.	**18.3**	**1.6**	**—**
			*18.3	1.6	—
White, old, boiled	150	1 med.	**29.6**	**2.1**	**—**
			*19.7	1.4	—
French fried	110	1 heaping c.	**41.0**	**4.2**	**9.9**
			*37.3	3.8	9.0
Roasted	150	1 med.	**41.0**	**4.2**	**1.5**
			*27.3	2.8	1.0
White, desiccated	100		**80.9**	**8.5**	**0.4**
			80.9	8.5	0.4
Potato chips, Saratoga	30	1⅓ c.	**14.0**	**2.0**	**11.9**
			46.7	6.8	39.8
Potato flour	100	⅔ c.	**83.0**	**0.5**	**0.1**
			83.0	0.5	0.1
Potato soup	250	1 c.	**27.5**	**5.2**	**11.0**
			*11.0	2.1	4.4
Prawn paste	6	1 t.		**1.3**	**0.5**
				21.6	8.6
Prawns	110	8 lg.		**25.1**	**1.4**
				22.8	1.3
Prawns, cooked	60	2 oz.		**12.7**	**1.0**
				21.2	1.8
Prawns, canned	60	2 oz		**13.9**	**0.8**
				23.2	1.5
Preserves, jellies, com.	12	1 t.	**7.7**	**—**	**—**
			64.0	—	—
Pretzels	25	6 med.	**18.2**	**2.4**	**1.0**
			72.8	9.7	3.9
Prickly pear	100	1 av.	**10.4**	**0.8**	**—**
			10.4	0.8	—

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remo
Negligible quantity is designated by

P

ood items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion. Carb.	Value of portion. Prot.	Value of portion. Fat.	Value of portion. Cal
eese, Mysost	30	1 oz.		**4.2**	**10.3**	**115**
				14 0	34.5	
soup, canned, conc.	140	½ c.	**1.4**	**8.5**	**—**	**40**
			1.0	6.1	—	
Italian cheese	30	1 oz.		**10.2**	**7.5**	**110**
				34 2	25.1	
. . . .	50	2 med.	**6.7**	**0.5**	**0.1**	**30**
			*13 3	0 9	0.2	
water pack	100	3, ½ c.	**6.4**	**0.4**	**0.1**	**30**
			*6.4	0.4	0.1	
, juice pack	100	3, ½ c.	**19.0**	**0.4**	**0.1**	**80**
			19.0	0.4	0.1	
, in syrup	100	3, ½ c.	**22.3**	**0.5**	**0.1**	**95**
			22.3	0.5	0.1	
. . . .	100	8 lg.	**40.3**	**2.4**	**—**	**175**
			*40.3	2.4	—	
cooked	100	4 med.	**29.3**	**0.8**	**—**	**125**
			29.3	0.8	—	
. . . .	120	½ c.	**34.6**	**1.0**	**0**	**145**
			28.8	0.8	0	
anned	120	½ c.	**15.6**	**0.5**	**0**	**65**
			*13.0	0.4	0	
. . . .	100	½ c.	**21.5**	**1.2**	**—**	**95**
			21.5	1.2	Trace	
s:						
dumpling	100		**28.1**	**2.4**	**9.3**	**210**
			*28.1	2.4	9.3	
a custard	50		**8.9**	**1.2**	**1.3**	**55**
			*17.9	2.5	2.6	
-mange	50		**9.1**	**1.6**	**1.8**	**60**
			*18.2	3.2	3.7	
olate cornstarch	50		**10.6**	**1.6**	**1.9**	**70**
			*21.2	3.3	3.8	
ard, egg, baked	50		**4.7**	**2.6**	**2.9**	**55**
			*9.4	5.2	5.9	
iled	50		**6.3**	**2.3**	**2.6**	**60**
			*12.7	4.7	5.3	
, Heinz	50		**24.1**	**1.7**	**4.9**	**150**
			48.2	3.5	9.9	
Heinz	50		**24.5**	**2.0**	**6.0**	**165**
			49.0	4.0	12.1	
, Heinz	90	3 oz.	**42.2**	**3.8**	**9.3**	**275**
			46.9	4.2	10.3	
(with milk)	100		**20.8**	**4.5**	**9.3**	**190**
			*20.8	4.5	9.3	
(with milk)	100		**5.8**	**0.9**	**1.1**	**40**
			*5.8	0.9	1.1	
lina (with milk)	100		**5.5**	**1.2**	**1.1**	**40**
			*5.5	1.2	1.1	
. . . .	100		**36.6**	**4.3**	**18.1**	**335**
			*36.6	4.3	18.1	
th raisins	100		**40.8**	**3.8**	**15.6**	**330**
			*40.8	3.8	15.6	
ca (with milk)	100		**20.8**	**3.2**	**3.8**	**135**
			*20.8	3.2	3.8	
ings for babies, see pages *to* 709.						
orn	23	1 c.	**19.4**	**2.2**	**0.1**	**90**
			84 3	9 6	0.4	
Rice, Quaker	15	1 c.	**13.3**	**0.9**	**—**	**60**
			88.8	6.2	0 2	
Wheat, Quaker	15	1 c.	**11.3**	**2.3**	**0.2**	**55**
			75.4	15.6	1.6	
nickel bread	25	1 sl.	**12.4**	**1.7**	**0.3**	**50**
			49.7	6.7	1.2	

P

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.
Pumpkin	120	¾ c.	4.8	1.2	0.1
			*4.0	1.0	0.1
Pumpkin, canned	125	½ c.	8.4	1.0	0.3
			6.7	0.8	0.2
Puréed foods, see page 703.					
Purslane	100		2.5	1.6	6.4
			*2.5	1.6	6.4

Q

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.
Quail	100	1 whole		24.0	6.4
				24.0	6.4
Quail, broiled	100	1 whole		22.0	6.0
				22.0	6.0
Quinces	240	1, 3″ x 2½″	1.4	0.7	0.2
			*0.6	0.3	0.1
Quince juice	120	½ c.	10.9	0.4	—
			*9.1	0.3	—
Quince-apple jam	25	1 T.	13.5	0.2	—
			54.0	0.7	Trace
Quinoa, dry seed	100		58.6	22.8	5.7
			*58.6	22.8	5.7
Quinoa flour, "petty rice"	100	⅔ c.	60.0	19.0	5.0
			*60.0	19.0	5.0
Quinoa, leafy shoots	100			2.4	0.2
				2.4	0.2

R

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.
‡Rabbit, front quarter, boiled	115	¼ lb.		31.6	1.1
				27.5	1.0
‡Rabbit, hind quarter, boiled	115	¼ lb.		33.2	1.3
				28.9	1.1
‡Rabbit, front quarter, broiled	115	¼ lb.		34.6	4.9
				30.1	4.3
‡Rabbit, hind quarter, broiled	115	¼ lb.		35.6	2.8
				31.0	2.4
Rabbit, stewed	115	¼ lb.		30.6	8.9
				26.6	7.7
Radishes	50	6 med.	1.7	0.7	0.1
			*3.5	1.3	0.1
Raisins, Muscat, dried (seeded)	75	½ c.	48.3	0.8	—
			*64.4	1.1	—
Raisins, Sultana or Thompson seedless, dried	60	⅓ c.	38.8	1.0	—
			*64.7	1.7	—
Ralston, Shredded	30	½ c.	23.2	2.6	0.3
			74.0	8.5	1.0
Ralston, wheat cereal	30	¼ c.	21.0	4.5	0.5
			70.0	15.0	1.7
Raspberries:					
Black	75	⅔ c.	7.3	1.3	0.8
			*9.7	1.7	1.0
Red	75	⅔ c.	7.3	0.8	0.4
			*9.7	1.0	0.6
Canned, water pack	140	⅔ c.	14.0	1.3	1.3
			10.0	0.9	0.9
Canned, juice pack	140	⅔ c.	18.2	0.8	0.6
			13.0	0.6	0.4

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remo
Negligible quantity is designated by

R

ood items.	Size of portion: Grams	Household measure.	Value of portion: Carb.	Prot.	Fat.	Cal
s:						
in syrup	140	⅔ c.	38.9 27.8	0.8 0.6	0.7 0.5	170
see also , canned.						
	40	¼ c	32.1 80.2	2.9 7.3	0.7 1.8	150
, black, juice	120	½ c.	12.8 10.7	0.2 0.2	— —	55
, red, juice	120	½ c.	10.0 8.3	0.5 0.4	— —	45
extract, Burnett,	6	1 t.	2.8 47.0	0 0	0 0	12
jam	25	1 T.	14.3 57.3	0.2 0.7	— Trace	60
na	140	1	32.0 22.7	1.8 1.3	1.1 0.8	150
age	60	½ c.	3.5 5.8	1.1 1.8	0.1 0.2	20
, see Venison.						
milk cheese	30	1 oz.	0.9 *3.0	7.1 23.8	12.9 43.1	155
ickle, com.	25	1 T.	7.0 28.0	0.1 0.5	0.1 0.3	30
	90	1 c. diced	2.3 *2.5	0.5 0.6	0.6 0.7	20
, cooked without sugar	100	⅔ c.	2.2 2.2	0.4 0.4	0.4 0.4	15
, canned, water pack	100	⅔ c.	3.0 3.0	0.4 0.4	0.4 0.4	18
b pie	100	1 sl.	29.8 *29.8	2.6 2.6	9.4 9.4	220
ented, Japanese	100		69.6 69.6	5.5 5.5	0.2 0.2	310
d	20	1 heaping T.	15.4 *76.8	1.4 7.2	0.4 2.0	75
ral brown, White House	20	1 heaping T.	15.3 76.1	1.3 6.7	0.5 2.2	70
hed	20	1 heaping T.	15.5 *77.4	1.4 6.9	0.1 0.4	70
e, White House	20	1 heaping T.	16.2 81.0	1.3 6.4	0.1 0.6	75
(Indian)	20	⅙ c.	13.1 65.4	2.8 14.0	0.2 0.9	65
d	100	½ c.	22.5 22.5	2.3 2.3	0.9 0.9	110
akes, Heinz	30	1 c.	25.0 83.2	3.2 10.5	0.3 0.9	120
akes, White House	30	1 c.	24.4 81.2	2.7 8.9	0.6 2.0	115
ur	100	⅞ c.	68.0 68.0	8.6 8.6	6.1 6.1	370
ispies, Kellogg	30	1 c.	26.5 88.4	1.8 6.0	0.1 0.3	115
lishings	100		64.0 64.0	11.6 11.6	10.1 10.1	405
dding (with milk)	100		20.8 *20.8	4.5 4.5	9.3 9.3	190
uffed, Quaker	15	1 c.	13.3 88.8	0.9 6.2	0.1 0.2	60
White House	20	1 heaping T.	16.1 80.3	1.3 6.6	0.1 0.6	70
Romano, Italian cheese	50	¼ c.		3.4 6.9	19.7 39.5	195

R

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion Carb	Value of portion Prot	Value of portion Fat
Ricotta salata, Italian cheese	30	1 oz.	**0.6**	**4.1**	**15.4**
			2.0	13.8	51.3
Rippled Wheat, Loose-Wiles	10	1 biscuit	**7.9**	**1.1**	**0.3**
			*78.8	11.1	2.5
Robinson's Patent Barley	9	1 T.	**7.0**	**0.6**	**0.1**
			*78.3	6.6	1.0
Robinson's Patent Groats	9	1 T.	**6.4**	**1.1**	**0.5**
			*71.5	12.4	6.0
Roe, cod, fried	60	2 oz.	**2.4**	**12.4**	**7.1**
			*3.0	20.6	11.9
Roe, herring, fried	60	2 oz.	**2.8**	**14.0**	**9.5**
			*4.7	23.4	15.8
Roe, shad	140	½ lg.	**3.6**	**29.3**	**5.3**
			2.6	20.9	3.8
Roe, sturgeon (caviar)	15	2 t.	**1.1**	**4.5**	**3.0**
			7.6	30.0	19.7
Rolled Oats	20	¼ c.	**13.3**	**3.3**	**1.5**
			66.3	16.7	7.3
Rolled Oats, cooked	120	½ c.	**16.8**	**4.2**	**1.8**
			14.0	3.5	1.5
Rolls:					
French	40	1	**22.3**	**3.4**	**1.0**
			55.7	8.5	2.5
Plain, enriched	50	1, 4½″ x 2½″	**27.0**	**4.1**	**3.0**
			54.1	8.2	6.1
Sweet, unenriched	50	1	**28.0**	**3.9**	**2.7**
			56.0	7.8	5.4
Vienna	50	1	**28.3**	**4.3**	**1.1**
			56.5	8.5	2.2
Water	40	1	**21.7**	**3.6**	**1.2**
			54.2	9.0	3.0
Romaine	50	5 leaves	**1.5**	**0.5**	—
			3.0	1.0	—
Romano cheese (Pecorino)	30	1 oz.		**9.3**	**8.3**
				31.2	27.7
Root beer	230	1 c.	**18.4**	—	—
			8.0	—	—
Root beer beverage, Hires	230	1 c.	**21.4**	**0**	**0**
			*9.3	0	0
Roquefort cheese	15	1″ x ½″ x 2½″	**0.3**	**3.4**	**4.4**
			*1.8	22.6	29.5
Roquette (Rocket salad)	100		**0.3**	**0.7**	**0.4**
			*0.3	0.7	0.4
Rose extract, Burnett, A.P.	5	1 t.	**0**	**0**	**0**
			0	0	0
Runko, with malt	15	1 T.	**12.6**	**0.6**	**0.4**
			83.7	3.8	2.6
Russian dressing	18	1 T.	**1.6**	**0.3**	**9.3**
			9.0	1.9	51.7
Russian turnips	120	¾ c.	**8.7**	**1.3**	**0.1**
			*7.3	1.1	0.1
Rutabagas (Swedish turnips)	120	¾ c.	**8.7**	**1.3**	**0.1**
			*7.3	1.1	0.1
Rye bread	25	1 sl.	**13.3**	**2.3**	**0.2**
			53.2	9.0	0.6
Rye bread, black	30	1 sl.	**14.7**	**2.9**	**0.2**
			48.9	9.6	0.6
Rye bread, Jewish	30	1 sl.	**15.6**	**2.7**	**0.3**
			52.0	9.1	1.1
Rye bread, whole	30	1 sl.	**11.4**	**3.6**	**0.2**
			34.7	11.9	0.6

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remo
Negligible quantity is designated by

R

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
grain	30	¾ c.	21.2	3.2	0.5	105
			*70.8	10.6	1.7	
of	50	½ c.	35.9	6.0	0.8	180
			71.8	12.0	1.6	
	30	1 c.	22.7	3.0	0.4	110
			*75.8	10.0	1.4	
see Flours.						
	130	1 c.	93.0	17.7	2.6	465
			71.5	13.6	2.0	
Ralston	6	1	4.4	0.7	0.1	20
			74.0	12.0	1.0	

S

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
	40	¼ c.	37.6	0.1	0.1	155
			*94.0	0.3	0.2	
l	100		83.9	0.9	0.2	350
			83.9	0.9	0.2	
ding (with milk)	100		5.8	0.9	1.1	40
			*5.8	0.9	1.1	
ssings:						
	20	1 T.	3.0	0.9	2.0	35
			15.0	4.5	10.0	
	11	2 t.	—	—	6.6	60
			—	—	60.0	
, com.	11	2 t.	2.0	0.1	3.9	45
			*18.1	0.6	35.5	
nnaise, com.	20	1 T.	0.4	0.3	16.0	150
			2.0	1.4	80.0	
al oil (Mayonnaise e)	15	1 T.	0.5	0.2	0.4	7
			3.0	1.5	2.7	
le Whip	20	1 T.	1.7	0.2	10.2	105
			8.5	1.2	50.9	
an	18	1 T.	1.6	0.3	9.3	95
			9.0	1.9	51.7	
Cream, com.	20	1 T.	2.0	0.4	5.6	60
			10.0	2.0	28.0	
sand Island, com.	15	1 T.	2.6	0.1	5.9	65
			17.3	0.8	39.0	
	60	2 oz.		14.3	22.1	265
				23.9	36.8	
:						
	230	½ lb.		50.6	29.4	480
				22.0	12.8	
ed	115	¼ lb.		29.5	1.4	135
				25.7	1.2	
d	115	¼ lb.	6.2	22.7	11.7	225
			5.4	19.7	10.2	
ned	115	¼ lb.		22.0	14.9	230
				19.1	13.0	
ed, Atlantic	100	½ c.		21.1	12.5	200
				21.1	12.5	
ed, Blueback	100	½ c.		20.0	4.5	125
				20.0	4.5	
ed, Chinook	100	½ c.		17.7	15.7	220
				17.7	15.7	
ed, Chum	100	½ c.		20.7	6.7	150
				20.7	6.7	
ed, Coho	100	½ c.		21.1	8.5	165
				21.1	8.5	
ed, Pink	100	½ c.		21.4	7.0	155
				21.4	7.0	

S

Food items.	Size of portion. Grams.	Household measure.	Value of Carb.	Prot.	Fat
Salmon:					
Canned, Sockeye . . .	100	⅓ c.		**20.8**	**11.2**
				20.8	11.2
Canned, steelhead trout .	100	⅓ c.		**21.3**	**9.0**
				21.3	9.0
Salmon paste	6	1 t.		**1.2**	**0.5**
				20.1	8.[illegible]
Salmon-anchovy paste . .	6	1 t.	**0.5**	**0.8**	**0.5**
			*8.5	14.0	9.1
Salmon-shrimp paste . . .	6	1 t.	**0.2**	**1.1**	**0.5**
			*4.2	18.2	9.3
Salsiccia, fresca di Napoli . .	60	2 oz.	**0.4**	**6.8**	**14.5**
			0.6	11.4	24.1
Salsiccia, secca di Basilicata .	60	2 oz.	**0.5**	**12.4**	**26.5**
			0.8	20.7	44.2
Salsify (vegetable oyster) . .	100	2, 6″ long	**15.5**	**3.5**	**1.0**
			15.5	3.5	1.0
Salsify, cooked	80	½ c.	**7.2**	**0.9**	**Trace**
			9.0	1.2	0.[illegible]
Samp, coarse hominy . . .	50	¼ c.	**39.7**	**4.2**	**0.3**
			79.4	8.3	0.5
Sandwich spread, Heinz . .	20	1 T.	**3.4**	**—**	**7.4**
			17.0	0.3	36.8
Sap Sago cheese	5	1 t. grated		**2.1**	**0.1**
				41.7	2.0
Sapodilla, Cuban	200	1 av.	**22.0**	**1.0**	**—**
			*11.0	0.5	—
Sapodilla, Florida	200	1 av.	**16.8**	**0.6**	**2.0**
			*8.4	0.3	1.0
Sardine-tomato paste . .	6	1 t.	**0.5**	**1.1**	**0.6**
			*7.9	19.0	9.5
Sardines in mustard or *Souse* sauce	100		**2.2**	**20.0**	**11.8**
			2.2	20.0	11.8
Sardines in oil (American) .	50	4, 2½″ long		**9.6**	**12.8**
				19.2	25.5
Sardines in oil (French) . .	75	3, 3¼″ long		**18.6**	**9.5**
				24.8	12.7
Sardines in tomato sauce (American)	95	1, 5″ long		**17.2**	**5.3**
				18.1	5.6
Sauces:					
Chili, com.	20	1 T.	**5.2**	**0.5**	**0.2**
			26.0	2.5	0.8
Cranberry	100	⅓ c.	**44.6**	**0.2**	**0.3**
			44.6	0.2	0.3
Hollandaise	40	2 T.	**—**	**1.0**	**17.5**
			—	2.5	43.8
Soy (Toyo), Philippine .	10	2 t.	**1.2**	**0.5**	**0.2**
			*12.0	4.5	1.5
Soy bean, Hawaiian . . .	10	2 t.	**0.5**	**0.8**	**—**
			5.0	7.8	—
Worcestershire, Lea & Perrins	5	1 t.	**1.0**	**Trace**	**—**
			19.0	1.1	Trace
Sauerkraut, raw	80	½ c.	**3.0**	**1.4**	**0.4**
			3.8	1.7	0.5
Sauerkraut, cooked . . .	100	‡ c.	**3.5**	**1.5**	**0.4**
			3.5	1.5	0.4
Sauerkraut, canned	100	‡ c.	**3.4**	**1.1**	**0.2**
			3.4	1.1	0.2
Sauerkraut juice	120	½ c.	**0.8**	**—**	**—**
			0.7	—	—

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remov
Negligible quantity is designated by

S

Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb.	Prot.	Fat.	Cal.
. . . .	115	¼ lb.		30.8	58.2	700
				26.8	50.6	
d	60	2 oz.	9.4	8.3	11.0	175
			*15.7	13.8	18.4	
. . . .	60	2 oz.	8.8	3.2	13.5	175
			*14.7	5.3	22.5	
. . . .	60	2 oz.		8.9	20.8	230
				14.8	34.6	
rst	60	2 oz.	0	7.0	13.1	150
			0	11.7	21.8	
. . . .	75	6 sl.	0.2	14.0	13.2	180
			0.3	18.7	17.6	
a, all meat . . .	75	6 sl.		10.8	13.3	170
				14.4	17.8	
a, added cereal . .	75	6 sl.	2.7	11.1	11.9	165
			3.6	14.8	15.9	
chweiger	60	2 oz.	0	9.2	14.3	170
			0	15.4	23.8	
ast	60	2 oz.	10.1	5.2	12.2	175
			*16.8	8.7	20.4	
ry style	115	¼ lb.		18.6	31.5	370
				16.2	27.4	
ot Farm, cooked . .	115	¼ lb.	—	22.9	62.3	670
			Trace	19.9	54.2	
r	115	¼ lb		33.4	48.3	585
				29.0	42.0	
fort (Frankfurter) .	120	2, 7" x ¾"	1.3	23.5	22.3	310
			1.1	19.6	18.6	
kfurter, all meat . .	120	2, 7" x ¾"		16.9	25.0	300
				14.1	20.8	
kfurter, added cereal .	120	2, 7" x ¾"	18.2	16.9	4.0	180
			15.2	14.1	3.3	
l cheese	115	¼ lb.		17.2	23.3	285
				15.0	20.3	
an:						
picollo	60	2 oz.	0.8	12.5	24.1	280
			1.4	20.8	40.2	
rvellata fresca . . .	60	2 oz.	0.3	6.0	20.6	215
			0.5	10.1	34.4	
lsiccia, fresca di Napoli	60	2 oz.	0.4	6.8	14.5	165
			0.6	11.4	24.1	
lsiccia secca di Basilicata	60	2 oz.	0.5	12.4	26.5	300
			0.8	20.7	44.2	
r	60	2 oz.	0.9	10.0	12.4	195
			1.5	16.7	20.6	
h style	60	2 oz.	0	9.8	13.9	130
			0	16.4	23.1	
. . . .	35	2, 3½" long	0.4	4.6	15.5	165
			1.1	13.0	44.2	
, fried	60	2 oz.	7.6	6.9	14.9	200
			*12.7	11.5	24.8	
and beef	60	⅛ lb.		11.6	14.5	180
				19.4	24.1	
mi	60	2 oz.		14.3	22.1	265
				23.9	36.8	
e	60	2 oz.	0	7.9	7.4	100
			0	13.2	12.3	
ner	60	⅛ lb.		15.6	26.7	310
				26.0	44.5	
cabbage	120	1 c.	7.2	4.0	0.8	55
			6.0	3.3	0.7	
cabbage, boiled . .	100	½ c.	1.1	1.3	—	10
			*1.1	1.3	—	

S

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.
Sbrinz cheese	30	1 oz.	0.4	10.2	8.5
			*1.3	34.0	[illegible]
Scallions, bulbs	12	4 sm.	2.1	0.1	Trace
			17.3	1.2	0.2
Scallops, sm.	100	10 (½ c.)	3.4	14.8	0.1
			3.4	14.8	0.1
Scallops, med.	175	10 (¾ c.)	5.9	25.9	0.2
			3.4	14.8	0.1
Scallops, lg.	220	6 (1 c.)	7.4	32.5	0.2
			3.4	14.8	0.1
Scallops, steamed	100	½ c.	—	22.4	1.4
			Trace	22.4	1.4
Scamorzza, Italian cheese	30	1 oz.	0.5	8.0	7.7
			*1.8	26.6	25.8
Schmierkäse	50	¼ c.		14.0	4.5
				28.0	9.0
Scones (with egg)	100	1	59.5	9.2	10.5
			*59.5	9.2	10.5
Scones (without egg)	100	1	57.1	8.4	13.2
			*57.1	8.4	13.2
Scotch broth, canned	240	1 c.	8.9	4.8	13.2
			3.7	2.0	5.5
Screw bean (Mesquite), dried	100		77.1	12.2	2.5
			77.1	12.2	2.5
Scup	230	½ lb.		43.7	11.5
				19.0	5.0
Sea-kale (sea-cabbage)	100	1½ c.	3.8	1.4	0.4
			3.8	1.4	0.4
Sea-kale, cooked	100	½ c.	0.3	0.4	0.1
			*0.3	0.4	0.1
Sea-trout	230	½ lb.		43.7	4.6
				19.0	2.0
Sea-perch	230	½ lb.	1.4	41.2	1.6
			0.6	17.9	0.7
Semolina	20	2 T.	15.5	2.3	0.4
			*77.5	11.7	1.8
Semolina pudding (milk)	100		5.5	1.2	1.1
			*5.5	1.2	1.1
Sesame seeds, black	100		8.9	19.7	45.4
			8.9	19.7	45.4
Shad	230	½ lb.		43.2	21.9
				18.8	9.5
Shad roe	140	½ lg.	3.6	29.3	5.3
			2.6	20.9	3.8
Shallots, bulbs	12	4 sm.	2.1	0.1	Trace
			17.3	1.2	0.2
Shepherd's pie	230	½ lb.	28.1	16.3	12.4
			*12.2	7.1	5.4
Sherbet	60	2 oz.	15.0	1.2	1.8
			*25.0	2.0	3.0
Shortbread	25	1 sq.	16.4	1.4	5.7
			65.6	5.8	23.0
Shredded Ralston	30	⅓ c.	23.2	2.6	0.3
			74.0	8.5	1.0
Shredded Wheat, N. B. C.	30	1 biscuit	24.5	3.3	0.5
			81.6	11.0	1.6
Shrimps	65	8 med.	1.1	12.5	0.3
			1.7	19.3	0.4
Shrimps, boiled	65	6 med.		14.1	0.5
				21.7	0.8
Shrimps, canned (dry pack)	65	8 med.		16.6	0.5
				25.5	0.8

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remov
Negligible quantity is designated by

S

…ood items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
…nned (wet pack) .	65	6 med.		**13.0**	**0.3**	**55**
				20.0	0.5	
…te	6	1 t.	**0.1**	**1.1**	**0.7**	**11**
			*2.5	18.3	11.5	
…p, cream of, canned	240	1 c.	**11.5**	**3.8**	**5.0**	**110**
			4.8	1.6	2.1	
…ream, see 20% Cream,						
…l	115	¼ lb.	**8.6**	**17.2**	**18.9**	**285**
			*7.5	15.0	16.4	
…	120	3, 5¾" long		**21.1**	**2.2**	**105**
				17.6	1.8	
…led	100	3	**5.0**	**25.0**	**30.8**	**410**
			*5.0	25.0	30.8	
…iled	30	6 lg.		**3.3**	**0.5**	**20**
				11.0	1.6	
…s	75	⅔ c.	**5.8**	**1.8**	**0.2**	**35**
			7.7	2.4	0.2	
…rican, is usually fillet …nder.						
…opean	230	½ lb.	**2.1**	**36.6**	**3.9**	**195**
			0.9	15.9	1.7	
…opean, fried . . .	115	¼ lb.	**6.2**	**23.1**	**21.2**	**315**
			*5.4	20.1	18.4	
…ropean, steamed . .	115	¼ lb.		**20.2**	**1.5**	**95**
				17.6	1.3	
…n syrup	20	1 T.	**12.7**		**—**	**50**
			*63.3		—	
…	160	½ c.	**100.8**	**3.8**	**—**	**430**
			*63.0	2.4	—	
…r dock	25	½ c.	Trace	**0.5**	Trace	**2**
			*0.1	2.1	0.2	
…nd Broths, canned:						
…ragus, Campbell, A.P. .	140	½ c.	**9.8**	**1.8**	**1.7**	**65**
			7.0	1.3	1.2	
…ragus, cream of, Heinz .	240	1 c.	**9.1**	**1.9**	**7.9**	**120**
			3.8	0.8	3.3	
…agus, cream of, Heinz	120	½ c.	**7.8**	**3.0**	**5.9**	**100**
			6.5	2.5	4.9	
…, Campbell, A.P. . .	140	½ c.	**19.6**	**8.5**	**2.5**	**140**
			14.0	6.1	1.8	
… with smoked pork, …inz	120	½ c.	**21.0**	**8.3**	**3.5**	**150**
			17.5	6.9	2.9	
… Campbell, A.P. . . .	120	½ c.	**9.8**	**6.7**	**1.6**	**85**
			8.2	5.6	1.3	
…noodle, Heinz . . .	120	½ c.	**7.2**	**5.9**	**4.3**	**95**
			6.0	4.9	3.5	
…with vegetables, Heinz	120	½ c.	**12.2**	**5.6**	**3.1**	**100**
			10.2	4.7	2.6	
…tock, vegetable, Heinz	120	½ c.	**17.0**	**3.5**	**1.1**	**95**
			14.2	2.9	0.9	
…lon, beef	240	1 c.	**0.7**	**6.2**	**0.2**	**30**
			0.3	2.6	0.1	
…lon, Campbell, A.P. .	120	½ c.	**0.1**	**4.7**	**—**	**20**
			0.1	3.9	—	
…y	230	1 c.	**11.5**	**4.8**	**6.4**	**125**
			5.0	2.1	2.8	
…y, Campbell, A.P. . .	140	½ c.	**9.5**	**2.0**	**2.2**	**70**
			6.8	1.4	1.6	
…y, cream of, Crosse & …ckwell	240	1 c.	**11.5**	**4.1**	**5.3**	**115**
			4.8	1.7	2.2	

S

Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb.	Prot	Fat
Soups and Broths, canned:					
Chicken, Campbell, A.P.	120	½ c.	**3.1**	**4.3**	**1.4**
			2.6	3.6	1.2
Chicken gumbo, Campbell, A.P.	140	½ c.	**12.0**	**4.2**	**1.0**
			8.6	3.0	0.7
Chicken noodle, Campbell, A.P.	120	½ c.	**8.0**	**4.7**	**1.8**
			6.7	3.9	1.5
Chicken noodle, Heinz	120	½ c.	**8.0**	**3.2**	**2.6**
			6.7	2.7	2.2
Clam chowder, Campbell, A.P.	140	½ c.	**13.6**	**4.2**	**5.7**
			9.7	3.0	4.1
Clam chowder, Heinz	120	½ c.	**12.2**	**2.6**	**1.9**
			10.2	2.2	1.6
Consommé, Campbell, A.P.	120	½ c.	**0.1**	**4.7**	**—**
			0.1	3.9	—
Fish chowder, Clapp	28.4	1 oz.	**2.2**	**0.5**	**—**
			7.6	1.8	0.2
Gumbo, Creole, Heinz	120	½ c.	**10.1**	**1.4**	**3.5**
			8.4	1.2	2.9
Julienne, Campbell, A.P.	120	½ c.	**1.1**	**3.1**	**—**
			0.9	2.6	—
Liver soup, Beech-Nut	28.4	1 oz.	**2.0**	**0.9**	**0.3**
			7.0	3.2	1.0
Liver soup, Campbell	28.4	1 oz.	**2.1**	**1.0**	**0.3**
			7.5	3.4	0.9
Liver soup, Clapp	28.4	1 oz.	**1.6**	**1.5**	**0.2**
			5.6	5.3	0.7
Liver soup, Gerber	28.4	1 oz.	**1.8**	**1.1**	**0.2**
			6.5	3.8	0.7
Liver soup, Libby	28.4	1 oz.	**2.2**	**1.1**	**—**
			7.8	3.9	0.2
Liver and beef soup, Heinz	28.4	1 oz.	**1.8**	**1.2**	**0.6**
			6.5	4.4	2.3
Mock turtle, Campbell, A.P.	130	½ c.	**7.8**	**7.5**	**1.0**
			6.0	5.8	0.8
Mulligatawny, Campbell, A.P.	150	½ c.	**16.1**	**4.1**	**0.8**
			10.7	2.7	0.5
Mushroom broth	120	½ c.	**—**	**—**	**0.2**
			1.2	1.1	0.2
Mushroom, cream of, Campbell, A.P.	140	½ c.	**13.2**	**5.0**	**8.5**
			9.4	3.6	6.1
Mushroom, cream of, Crosse & Blackwell	240	1 c.	**11.5**	**4.6**	**5.3**
			4.8	1.9	2.2
Mushroom, cream of, Heinz	120	½ c.	**11.0**	**4.2**	**6.2**
			9.2	3.5	5.2
Mutton, Campbell, A.P.	150	½ c.	**6.9**	**6.4**	**0.8**
			4.9	4.6	0.6
Onion, cream of, Crosse & Blackwell	240	1 c.	**11.3**	**4.1**	**5.0**
			4.7	1.7	2.1
Oxtail, Campbell	140	½ c.	**11.9**	**5.5**	**2.4**
			8.5	3.9	1.7
Oyster, cream of, Crosse & Blackwell	240	1 c.	**10.3**	**3.6**	**5.5**
			4.3	1.5	2.3

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remo
Negligible quantity is designated by

S

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
i Broths, canned:						
mpbell, A.P.	140	½ c.	**17.4**	**6.7**	**2.2**	**120**
			12.4	4.8	1.6	
inz	120	½ c.	**11.5**	**3.5**	**2.4**	**85**
			9.6	2.9	2.0	
-pot, Campbell, A.P.	140	½ c.	**11.5**	**6.4**	**4.2**	**115**
			8.2	4.6	3.0	
-pot, Heinz	120	½ c.	**10.8**	**4.8**	**3.7**	**100**
			9.0	4.0	3.1	
nier, Campbell, A.P.	140	½ c.	**1.4**	**8.5**	**—**	**40**
			1.0	6.1	—	
broth, Heinz	120	½ c.	**11.0**	**4.9**	**5.2**	**115**
			9.2	4.1	4.3	
·, cream of, Crosse & kwell	240	1 c.	**11.5**	**3.8**	**5.0**	**110**
			4.8	1.6	2.1	
·h, cream of, Crosse & ckwell	240	1 c.	**11.5**	**4.3**	**5.0**	**110**
			4.8	1.8	2.1	
to, Campbell, A.P.	140	½ c.	**13.4**	**2.2**	**2.0**	**80**
			8.9	1.6	1.4	
to, Heinz	240	1 c.	**16.3**	**2.0**	**1.8**	**90**
			13.6	1.7	1.5	
able, Campbell, A.P.	140	½ c.	**17.4**	**5.2**	**2.0**	**110**
			12.4	3.7	1.4	
able beef, Campbell, P.	140	½ c.	**7.8**	**11.1**	**2.9**	**105**
			5.6	7.9	2.1	
tarian vegetable, Heinz	120	½ c.	**19.2**	**3.5**	**0.5**	**100**
			16.0	2.9	0.4	
dried ingredients:						
y Crocker pea soup	113	1 pkg.	**68.7**	**26.4**	**1.7**	**395**
			60.6	23.3	1.5	
y Crocker vegetable odle soup (meat flavor)	64	1 pkg.	**37.3**	**6.4**	**1.7**	**190**
			58.5	10.1	2.6	
p, "sour apple," West es	115	⅕ av.	**19.7**	**0.9**	**0.1**	**85**
			17.2	0.8	0.1	
	60	2 oz.	**0**	**7.9**	**7.4**	**100**
			0	13.2	12.3	
ans:						
n	75	½ c.	**9.9**	**10.2**	**4.9**	**130**
			13.2	13.6	6.3	
n, cooked	125	½ c.	**17.2**	**18.2**	**4.4**	**195**
			13.8	14.4	3.5	
ed	100	½ c.	**16.5**	**15.1**	**7.6**	**200**
			16.5	15.1	7.6	
nented	100		**3.1**	**18.7**	**9.4**	**175**
			3.1	18.7	9.4	
, canned	250	1 c.	**10.0**	**50.0**	**32.6**	**550**
			4.0	20.0	13.0	
d	100	½ c.	**33.1**	**30.2**	**15.3**	**400**
			33.1	30.2	15.3	
Bean:						
l (Tofu)	100		**1.6**	**9.0**	**4.1**	**80**
			1.6	9.0	4.1	
r	100	1¼ c. sc	**8.0**	**45.0**	**11.0**	**320**
			8.0	45.0	11.0	
l	100	1¼ c. sc.	**8.2**	**38.3**	**14.9**	**325**
			*8.2	38.3	14.9	
	100		**0.6**	**3.5**	**2.4**	**40**
			0.6	3.5	2.4	

S

Food items.	Size of portion: Grams.	Household measure.	Value of port[illegible]: Carb.	Prot.	Fat
Soy bean:					
Sauce, Hawaiian	10	2 t.	**0.5**	**0.8**	**—**
			5.0	7.8	—
Sauce (Toyo), Philippines	10	2 t.	**1.2**	**0.5**	**0.2**
			*12.0	4.5	1.5
Sprouts	65	½ c.	**4.1**	**5.5**	**1.2**
			6.3	8.5	[illegible]
Spanish melon	200	½ med.	**10.0**	**1.2**	**—**
			*5.0	0.6	—
Spaghetti	100	¾ c.	**75.9**	**12.1**	**0.4**
			75.9	12.1	0.4
Spaghetti in tomato sauce, Heinz	240	1 c.	**35.5**	**5.0**	**0.7**
			14.8	2.1	0.3
Spinach	75	1½ c.	**1.7**	**1.6**	**0.2**
			*2.3	2.1	0.3
Spinach, cooked	100	½ c.	**0.8**	**2.0**	**0.2**
			*0.8	2.0	0.2
Spinach, canned	225	1 c.	**5.4**	**5.4**	**0.7**
			2.4	2.4	0.3
Spinach, New Zealand	75	1½ c.	**3.1**	**1.7**	**0.2**
			4.1	2.2	0.2
Spinach soup, cream of, canned	240	1 c.	**13.4**	**4.6**	**15.2**
			5.6	1.9	5.9
Spleen, fresh:					
Beef and veal	115	¼ lb.		**20.8**	**3.5**
				18.1	3.0
Hog	115	¼ lb.		**19.7**	**4.4**
				17.1	3.8
Sheep	115	¼ lb.		**21.6**	**4.5**
				18.8	3.9
Sponge cake	50	1 sq.	**26.7**	**4.7**	**3.5**
			*53.5	9.5	7.0
Sprats	230	½ lb.		**39.3**	**33.3**
				17.1	14.5
Sprats, fresh, fried	60	2 oz.		**13.4**	**22.7**
				22.3	37.9
Sprats, smoked, grilled	60	2 oz.		**15.1**	**13.9**
				25.1	23.2
Spring greens, boiled	100	½ c.	**0.9**	**1.7**	**—**
			*0.9	1.7	—
Squab (pigeon)	50	1 whole		**9.3**	**11.0**
				18.6	22.1
Squab, with skin, cooked	50	1 whole		**9.5**	**11.0**
				19.0	22.0
Squash:					
Cushaw	125	1 c.	**9.1**	**1.5**	**0.4**
			7.3	1.2	0.3
Summer, white	250	1¾ c. diced	**9.8**	**1.5**	**0.3**
			3.9	0.6	0.1
Summer, boiled	100	⅔ c.	**3.5**	**0.5**	**—**
			3.5	0.5	Trace
Winter	250	1¾ c. diced	**22.0**	**3.8**	**0.8**
			8.8	1.5	0.3
Winter, boiled	100	⅔ c.	**4.0**	**1.0**	**0.3**
			*4.0	1.0	0.3
Canned	125	½ c.	**13.1**	**1.1**	**0.6**
			10.5	0.9	0.5
Squeteague (sea-trout)	230	½ lb.		**43.7**	**4.6**
				19.0	2.0

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remo[illegible]
Negligible quantity is designated b[illegible]

S

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
aw	50	6 med.	8.3	1.3	—	40
			*16.6	2.7	Trace	
kidney pie . . .	115	¼ lb.	19.2	17.7	21.7	355
			*16.7	15.4	18.9	
ese	25	1½″ × 1½″ × 1¼″	—	7.3	7.8	105
			—	29.0	31.2	
bread (carob bean) .	10	4″ piece	6.7	0.6	0.1	30
			67.0	5.7	1.1	
foods, see page 703.						
ries:						
. . . .	100	¾ c.	6.0	1.0	0.6	35
			*6.0	1.0	0.6	
l	120	⅔ c.	28.8	0.8	—	120
			24.0	0.7	—	
d, water pack . .	120	⅔ c.	7.0	0.7	0.5	35
			5.8	0.6	0.4	
d, juice pack . . .	120	⅔ c.	9.6	1.0	1.0	50
			8.0	0.8	0.8	
l, in syrup . . .	120	⅔ c.	33.6	0.6	0.2	125
			28.0	0.5	0.2	
rry . extract, Burnett, ...	6	1 t.	2.8	0	0	12
			47.0	0	0	
rry jam, com. . . .	25	1 T.	17.1	0.1	—	70
			*68.5	0.5	Trace	
rry juice	120	½ c.	6.1	0.2	—	25
			5.1	0.2	—	
beans	75	¾ c.	5.8	1.8	0.2	35
			7.7	2.4	0.2	
beans, cooked . . .	130	⅔ c.	4.5	1.3	0.1	25
			3.5	1.0	0.1	
beans, boiled in much r	130	⅔ c.	2.5	1.0	0.1	15
			1.9	0.8	0.1	
beans, canned . . .	130	⅔ c.	4.9	1.4	0.1	25
			3.8	1.1	0.1	
on	230	½ lb.		35.4	3.7	180
				15.4	1.6	
on, steamed	115	¼ lb.		28.4	6.6	180
				24.7	5.7	
on caviar	15	2 t.	1.1	4.5	3.0	50
			7.6	30.0	19.7	
ash, canned	210	¾ c.	37.1	7.5	2.1	200
			*17.7	3.6	1.0	
eef	10	1 T		0.5	8.2	80
				4.7	81.8	
udding	100		36.6	4.3	18.1	335
			*36.6	4.3	18.1	
udding with raisins .	100		40.8	3.8	15.6	330
			*40.8	3.8	15.6	
:						
, brown	10	1 T.	9.1	—	—	35
			*91.0	—	—	
erara	10	1 T.	9.9	—	—	40
			*99.3	0.5	—	
, granulated . . .	105	½ c.	104.9	—	—	430
			*99.9	—	—	
, granulated . . .	13	1 T.	13.0	—	—	50
			*99.9	—	—	
, coarse, powdered .	90	½ c.	89.9	—	—	370
			*99.9	—	—	
, anhydrous . . .	10	1 T.	10.0	—	—	40
			*?100.0	—	—	

S

Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb.	Prot.	Fat
Sugars:					
Crystal squares, Domino .	3	1	**2.8**	**—**	**—**
			*99.9	—	—
Crystal tablets, Domino .	5	1	**4.9**	**—**	**—**
			*99.9	—	—
Granulated	105	½ c.	**104.9**	**—**	**—**
			*99.9	—	—
Granulated	5	1 t.	**5.0**	**—**	**—**
			*99.9	—	—
Maple	60	1, 1½" sq.	**49.7**	**—**	**—**
			*82.8	—	—
Old fashioned brown, Domino	10	1 T.	**9.3**	**0**	**0**
			*92.8	0	0
Tablet	5	1 tablet	**5.0**	**—**	**—**
			*?100.0	—	—
Surinam-cherry	30	10	**6.7**	**0.3**	**—**
			22.3	1.0	0.1
Swedes	120	¾ c.	**5.2**	**1.7**	**—**
			*4.3	1.4	—
Swedes, boiled	120	½ c.	**4.6**	**1.1**	**—**
			*3.8	0.9	—
Sweetbreads:[1]					
Beef	115	¼ lb.		**19.3**	**13.9**
				16.8	12.1
Beef, med. fat	115	¼ lb.		**16.5**	**28.7**
				13.5	25.0
Beef, boiled‡	80	2		**17.8**	**6.8**
				22.2	8.6
Beef, broiled‡	115	3		**29.6**	**10.5**
				25.7	9.9
Beef, canned	115	¼ lb.		**23.2**	**10.5**
				20.2	9.1
Hog	115	¼ lb.		**16.7**	**27.4**
				14.5	23.8
Veal	115	¼ lb.		**22.1**	**10.1**
				19.2	8.8
Stewed	60	2 oz.		**13.6**	**5.5**
				22.7	9.1
Sweet potatoes	150	1, 6" x 1¾"	**39.2**	**2.7**	**1.1**
			*26.1	1.8	0.7
Sweet potatoes, baked . .	100	½ lg.	**32.2**	**2.1**	**0.8**
			32.2	2.1	0.8
Sweet potatoes, boiled . .	100	1 med.	**20.1**	**1.1**	**0.5**
			*20.1	1.1	0.5
Sweet potatoes, canned . .	75	2 sm.	**31.1**	**1.4**	**0.3**
			41.4	1.9	0.4
Sweetpotato tops	100		**6.3**	**2.3**	**0.3**
			6.3	2.3	0.3
wift's meats for babies, see Spages 706, 709.					
Swiss chard, leaves only . .	100	1⅓ c.	**4.8**	**2.6**	**0.4**
			4.8	2.6	0.4
Swiss chard, leaves and stalks .	100	1 c.	**4.4**	**1.4**	**0.2**
			4.4	1.4	0.2
Swiss chard, stalks only . .	125	1 c.	**3.6**	**1.3**	**0.1**
			2.9	1.0	0.1
Swiss chard, cooked	100	⅔ c.	**3.0**	**2.4**	**0.2**
			3.0	2.4	0.2
Swiss cheese	30	2 cu. in.	**0.4**	**8.3**	**10.4**
			*1.3	27.6	34.9

[1] Generally thyroid gland.
* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remo
Negligible quantity is designated by

S

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
e, Kraft	30	⅛ in. 5# loaf		7.9	7.8	105
				26.5	26.0	
lish cheese	30	2 cu. in.	1.8	6.9	10.9	135
			*6.1	23.2	36.4	
sian cheese	30	2″ x 1″ x 1″	1.3	7.4	9.6	125
			*4.4	24.9	32.3	
fresh	230	½ lb.		43.0	7.1	240
				18.7	3.1	
d cane	160	½ c.	118.7	0.4	—	490
			*74.2	0.2	—	
	160	½ c.	115.2	0	0	470
			*72.0	0	0	
golden	20	1 T.	15.8	—	—	65
			*79.0	0.3	—	
Blue Label	20	1 T.	14.8	0	0	60
			*74.0	0	0	
Green Label	160	½ c.	120.0	0	0	490
			*75.0	0	0	
Green Label	20	1 T.	15.0	0	0	60
			*75.0	0	0	
Red Label	160	½ c.	120.0	0	0	490
			*75.0	0	0	
hn	18	1 T.	11.9	0	0	50
			*66.0	0	0	
	18	1 T.	1.28	—	—	50
			*71.4	—	—	
m	20	1 T.	12.7		—	50
			*63.3		—	
	160	½ c.	100.8	3.8	—	430
			*63.0	2.4	—	
cane	160	½ c.	110.6	0.8	—	450
			*69.1	0.4	—	

T

Food items.	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
Sauce			0	0	0	0
			0	0	0	
nes, Mandarin orange	100	2, 2″ diam.	8.0	0.9	—	35
			*8.0	0.9	—	
nd, Florida	5	1 lg.	3.9	0.5	0.3	20
			*29.4	2.7	1.3	
juice	120	½ c.	10.8	0.8	—	50
			9.0	0.7	—	
ne juice	120	½ c.	10.0	1.1	0.4	50
			9.2	0.9	0.3	
	40	¼ c.	35.2	0.2	Trace	145
			88.0	0.4	0.1	
, Minute	40	¼ c.	35.2	0.2	Trace	145
			88.0	0.4	0.1	
pudding	100		20.8	3.2	3.8	135
			*20.8	3.2	3.8	
aves and stems	100		5.8	2.7	0.7	40
			*5.8	2.7	0.7	
hoots	100		2.2	0.9	0.1	14
			2.2	0.9	0.1	
ber	150	1 med.	33.6	2.7	0.3	150
			*22.4	1.8	0.2	
eamed	100		26.4	1.2	0.2	115
			*26.4	1.2	0.2	
ck leaves	2.3	1 ball[1]	—	0.4	—	1
			*1.7	16.0	Trace	
sion	140	1 teacup	—	—	—	—
			Trace	0.1	Trace	

nts of 1 standard tea ball, 2.3 grams.

T

Food items.	Size of portion. Grams.	Household measure.	Value of ... Carb.	Prot.	Fat
Terrapin	115	¼ lb.		**24.4**	**4.0**
				21.2	3.5
Thousand Island dressing, com.	15	1 T.	**2.6**	**0.1**	**5.9**
			17.3	0.8	39.0
Toasts:					
Graham bread	20	1 sl.	**13.0**	**2.2**	**0.5**
			65.0	11.0	2.5
Melba, white bread	20	2 sl., 4" sq.	**15.8**	**2.8**	**0.4**
			79.0	14.0	1.8
Rye bread	18	1 sl.	**13.3**	**2.3**	**0.2**
			73.9	12.8	1.1
White bread	15	1 sl.	**10.7**	**1.9**	**0.3**
			71.1	13.3	2.2
Toffee, home-made	10	1 sq.	**8.8**	**—**	**0.6**
			*87.8	0.2	6.2
Tomatoes:					
Fresh, ripe	125	1 small	**4.1**	**1.1**	**0.5**
			*3.3	0.9	0.4
Fried	100		**3.3**	**1.0**	**5.9**
			*3.3	1.0	5.9
Green or unripe	125	1, 2½" diam.	**4.1**	**1.5**	**0.3**
			3.3	1.2	0.2
Cooked	130	½ c.	**5.2**	**1.3**	**0.3**
			4.0	1.0	0.2
Canned	130	½ c.	**4.5**	**1.6**	**0.3**
			*3.5	1.2	0.2
Dried	100		**62.3**	**12.9**	**8.1**
			62.3	12.9	8.1
Tomato:					
Bouillon, canned	240	1 c.	**1.0**	**2.6**	**0.7**
			0.4	1.1	0.3
Catsup	20	1 T.	**4.8**	**0.4**	**0.2**
			24.0	2.0	1.0
Juice, canned	120	½ c.	**4.3**	**1.2**	**0.1**
			3.6	1.0	0.1
Juice cocktail	60	¼ c.	**2.1**	**1.1**	**—**
			*3.6	0.9	0.1
Ketchup, com.	20	1 T.	**5.0**	**0.5**	**0.2**
			25.0	2.5	0.8
Paste, canned	15	1 T.	**2.8**	**0.7**	**0.2**
			18.7	4.7	1.4
Pomace	100			**24.0**	**4.0**
				24.0	4.0
Sauce, canned	15	1 T.	**1.4**	**0.1**	**0.1**
			9.0	0.4	0.3
Soup, canned, conc.	140	½ c.	**13.4**	**2.2**	**2.0**
			8.9	1.6	1.4
Soup, cream of, canned	240	1 c.	**21.6**	**2.9**	**5.7**
			9.0	1.2	2.4
Tomcod, whole	230	½ lb.		**39.6**	**0.9**
				17.2	0.2
Tongue, fresh:					
Beef, lean	115	¼ lb.	**0.5**	**20.0**	**12.7**
			0.4	17.4	11.0
Beef, medium	115	¼ lb.	**0.5**	**18.9**	**17.3**
			0.4	16.4	15.0
Beef, fat	115	¼ lb.	**0.5**	**17.9**	**20.7**
			0.4	15.7	18.0
Beef, very fat	115	¼ lb.	**0.5**	**16.6**	**26.5**
			0.4	14.4	23.0
Calf	115	¼ lb.	**1.0**	**21.3**	**6.1**
			0.9	18.5	5.3

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat remov
Negligible quantity is designated by

...d items.	Size of portion.		Value of portion.			T
	Grams.	Household measure.	Carb.	Prot.	Fat.	Cal.
...h:						
	115	¼ lb.	**0.6**	**16.0**	**17.6**	**230**
			0.5	13.9	15.3	
	115	¼ lb.	**2.8**	**15.8**	**25.1**	**310**
			2.4	13.7	21.8	
	115	¼ lb.	**0.6**	**19.3**	**17.9**	**250**
			0.5	16.8	15.6	
...ked:						
...oiled‡	115	¼ lb.		**25.1**	**17.6**	**265**
				21.8	15.3	
... boiled‡	115	¼ lb.		**24.1**	**29.3**	**370**
				21.0	25.5	
...ied	50	3 sl.		**9.7**	**16.6**	**205**
				19.5	23.2	
...lled	60	2 oz.		**7.7**	**12.3**	**145**
				12.8	20.5	
...d	60	2 oz.	**1.4**	**11.5**	**14.3**	**185**
			*2.3	19.1	23.9	
... deviled	6	1 t.	**—**	**1.1**	**1.4**	**18**
			0.7	18.6	23.0	
...ewed	115	¼ lb.		**20.7**	**27.6**	**340**
				18.0	24.0	
...ieese	25	1½" x 1" x ¾"		**5.3**	**6.3**	**80**
				21.2	25.2	
...ack	25	1 T.	**16.8**	**0.3**	**0**	**10**
			*67.2	1.2	0	
...ved	115	¼ lb.		**20.7**	**3.4**	**115**
				18.0	3.0	
...f, canned	115	¼ lb.		**19.3**	**9.8**	**170**
				16.8	8.5	
...kled	115	¼ lb.	**0.2**	**13.5**	**1.4**	**70**
			0.2	11.7	1.2	
...N. B. C.	10	2	**8.2**	**1.1**	**0.2**	**40**
			81.7	10.5	1.6	
...ook	230	½ lb.		**44.2**	**4.8**	**235**
				19.2	2.1	
...ook, cooked	115	¼ lb.	**1.3**	**24.3**	**2.7**	**130**
			1.2	21.2	2.4	
...mon or lake	230	½ lb.		**40.9**	**23.7**	**490**
				17.8	10.3	
...amed	115	¼ lb.		**25.6**	**5.2**	**155**
				22.3	4.5	
..., steamed	115	¼ lb.		**24.3**	**5.5**	**150**
				21.1	4.8	
	100		**—**	**—**	**0.6**	**5**
			6.0	6.1	0.6	
...lack	100		**—**	**—**	**0.5**	**5**
			7.6	8.7	0.5	
...hite	100		**—**	**—**	**0.6**	**5**
			7.9	8.9	0.6	
...ny fish)	230	½ lb.		**75.2**	**26.2**	**550**
				26.6	11.4	
...l	90	½ c.		**22.9**	**17.6**	**260**
				25.4	19.6	
	230	½ lb.		**34.0**	**33.1**	**445**
				14.8	14.4	
...eamed	115	¼ lb.		**23.8**	**1.8**	**115**
				20.7	1.6	
	230	½ lb.		**48.5**	**52.7**	**690**
				21.1	22.9	
...zzard	100		**1.3**	**20.5**	**10.6**	**190**
			1.3	20.5	10.6	
...art	30	1 oz.	**0.1**	**4.9**	**3.8**	**55**
			0.2	16.2	12.7	

T

Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb.	Prot.	[illegible]
‡Turkey, breast, roasted	115	¼ lb.		36.5 31.8	2.5 [illegible]
‡Turkey, thigh and leg, roasted	115	¼ lb.		31.3 27.3	8.5 7.4
Turkey egg, see Eggs.					
Turnip cabbage (kohlrabi)	100	½ c.	4.2 *4.2	2.0 2.0	0.1 0.1
Turnip salad greens	50	½ c.	3.2 6.3	2.1 4.2	0.3 0.6
Turnip tops	100	1 c.	5.4 5.4	2.9 2.9	0.4 0.4
Turnip tops, boiled	100	½ c.	0.1 *0.1	2.7 2.7	— —
Turnips, white	120	¾ c. diced	8.2 *6.8	1.6 1.3	0.2 0.2
Turnips, yellow	120	¾ c. diced	7.3 *6.1	1.6 1.3	0.2 0.2
Turnips, yellow, boiled	125	½ c.	5.5 *4.4	1.1 0.9	0.1 0.1
Turnip-rooted celery (celeriac)	90	1 med.	7.9 8.8	1.3 1.7	0.3 0.3
Turnip-rooted parsley, roots	100		9.2 9.2	2.1 2.1	0.2 0.2
Turtle, green	115	¼ lb.		22.7 19.8	0.6 0.5
Turtle, green, canned	75	⅛ lb.		17.5 23.4	0.5 0.7
Turtle egg, see Eggs.					
Turtle soup, canned	240	1 c.	8.2 3.4	2.6 1.1	1.0 0.4

U

Food items.	Grams.	Household measure.	Carb.	Prot.	[illegible]
Udo, shoots	100		2.4 *2.4	1.0 1.0	0.2 0.2

V

Food items.	Grams.	Household measure.	Carb.	Prot.	[illegible]
Vanilla extract, Burnett	5	1 t.	0.4 7.0	0 0	0 0
Veal, fresh:					
Brains	230	½ lb.		23.8 10.6	20.7 9.0
Breast, very lean	230	½ lb.		53.1 23.1	5.8 2.5
Breast, lean	230	½ lb.		48.8 21.2	18.4 8.0
Breast, all analyses	230	½ lb.		46.7 20.3	25.3 11.0
Chops, med. fat	100	1 chop, ⅜″ thick		19.9 19.9	10.8 10.8
Chuck, lean	230	½ lb.		47.4 20.6	4.4 1.9
Chuck, all analyses	230	½ lb.		45.3 19.7	13.3 5.8
Cutlet	230	½ lb.		46.7 20.3	17.7 7.7
Flank	230	½ lb.		46.2 20.1	29.2 12.7

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat re…
Negligible quantity is designated…

V

d items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
er	230	½ lb.		46.0	18.4	360
				20.0	8.0	
	115	¼ lb.		19.3	11.0	180
				16.8	9.6	
	115	¼ lb.	0.2	19.3	6.0	135
			0.2	16.8	5.2	
	230	½ lb.		49.0	9.4	290
				21.3	4.1	
alyses	230	½ lb.		47.6	15.4	340
				20.7	6.7	
	230	½ lb.		43.7	12.2	295
				19.0	5.3	
	230	½ lb.		46.9	12.9	310
				20.4	5.6	
analyses	230	½ lb.		45.8	23.0	400
				19.9	10.0	
	115	¼ lb.		19.7	5.8	135
				17.1	5.0	
	230	½ lb.	3.5	40.9	36.7	510
			1.5	17.8	16.0	
	230	½ lb.		46.7	15.9	340
				20.3	6.9	
lium fat	230	½ lb.		47.6	14.0	325
				20.7	6.1	
analyses	230	½ lb.		46.5	21.6	390
				20.2	9.4	
	230	½ lb.		45.5	37.2	535
				19.8	16.2	
fore	230	½ lb.		47.6	12.0	305
				20.7	5.2	
hind, medium fat	230	½ lb.		47.6	10.6	295
				20.7	4.6	
r, lean	230	½ lb.		47.6	10.6	295
				20.7	4.6	
	230	½ lb.		46.5	18.6	365
				20.2	8.1	
ked:						
boiled	115	¼ lb.		13.8	6.7	120
				12.0	5.8	
, broiled	80	1 av.		22.7	2.7	120
				28.4	3.4	
fried	80	1 av.	3.5	24.3	6.5	175
			*4.4	30.4	8.1	
roasted	80	1 av.		23.2	9.6	180
				29.0	12.0	
oasted	115	¼ lb.		33.4	0.8	145
				29.1	0.7	
fried	115	¼ lb.		27.6	9.8	205
				24.0	8.5	
l, cold	115	¼ lb.		37.0	13.1	275
				32.2	11.4	
marrow	100	⅔ c.	1.4	0.5	0.1	10
			*1.4	0.5	0.1	
marrow, cooked	100	⅔ c.	0.2	0.1	—	1
			*0.2	0.1	Trace	
oyster (salsify)	100	2, 6″ long	15.5	3.5	1.0	85
			15.5	3.5	1.0	
oyster, cooked	80	½ c.	7.2	0.9	Trace	35
			9.0	1.2	0.1	
pear, see Chayote.						
soup, canned, conc.	140	½ c.	17.4	5.2	2.0	110
			12.4	3.7	1.4	
soup, canned	250	1 c.	15.0	3.8	1.3	90
			6.0	1.5	0.5	

V

Food items	Size of portion. Grams	Household measure.	Value of portion Carb.	Prot.	Fat
Vegetable soup, see also Soups, canned.					
Vegetables, mixed, canned	80	½ c.	2.5 *3.1	1.1 1.4	— —
Vegex (Marmite)	4	1 t.	0 0	1.3 32.[illegible]	0.[illegible] [illegible]
Velveeta, Kraft	30	3, $\frac{3}{16}$″ sl. ⅓‡	1.8 *6.0	5.4 18.0	7.[illegible] 25.[illegible]
Vendôme cheese	30	2 T.		8.4 28.0	6.[illegible] 20.[illegible]
Venison, fresh:					
Forequarter	230	½ lb.		50.1 21.8	21.6 9.[illegible]
Hindquarter	230	½ lb.		44.6 19.4	44.[illegible] 19.[illegible]
Lean meat only	230	½ lb.		46.0 20.0	13.8 6.[illegible]
Side	230	½ lb.		47.2 20.5	33.1 14.[illegible]
Venison, roasted	115	¼ lb.		38.5 33.5	7.4 6.4
Vermicelli, uncooked	60	½ c.	43.2 72.0	6.5 10.9	1.2 2.[illegible]
Vinegars:					
Cider	5	1 t.	Trace 0.8	0 0	0 0
Malt	5	1 t.	Trace 0.5	0 0	0 0
Spiced, salad	5	1 t.	0.5 10.0	0 0	0 0
Tarragon	5	1 t.	Trace 0.2	0 0	0 0
Wine	5	1 t.	Trace 0.4	0 0	0 0
Vinespinach	75	1½ c.	1.8 *2.4	1.5 2.0	0.2 0.3

W

Food items	Grams	Household measure	Carb.	Prot.	Fat
Walnuts, black	35	6 (whole)	3.5 *10.0	9.7 27.6	19.7 56.3
Walnuts, California or English	35	6 (whole)	1.8 *5.0	4.4 12.5	18.0 51.5
Walnuts, soft-shell	35	6 (whole)	4.7 13.5	5.8 16.6	22.2 63.4
Water chestnuts	100	10, 1¼″ diam.	15.6 *15.6	1.5 1.5	0.1 0.1
Water crackers	18	2	12.9 71.9	1.9 10.7	1.6 8.8
Water ices, com.	120	½ c.	39.5 33.0	0.6 0.5	0 0
Water oats (wild rice)	20	⅛ c.	13.1 65.4	2.8 14.0	0.[illegible] 0.[illegible]
Water rolls	40	1	21.7 54.2	3.6 9.0	1.2 3.0
Watercress	20	½ c.	0.1 *0.7	0.6 2.9	— —
Watermelon	240	1 c. diced	16.0 6.7	0.9 0.4	0.[illegible] 0.[illegible]
Waternut, tubers	100		16.5 *16.5	1.5 1.5	0.[illegible] 0.[illegible]

* Largely assimilable.
Blank space indicates lack of data.

‡ Gross fat r[illegible]
Negligible quantity is designat[illegible]

W

items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
. . . .	75	½ c.	**11.0**	**3.5**	**0.2**	60
			14.6	4.7	0.3	
nned . . .	130	¾ c.	**3.2**	**1.3**	**0.1**	20
			*2.5	1.0	0.1	
. . . . .	230	½ lb.		**40.9**	**5.5**	220
				17.8	2.4	
. . . .	50		**10.3**	**7.6**	**17.7**	250
			*20.7	15.2	35.5	
. . . .	10	1 T.		**—**	**10.0**	95
				Trace	99.7	
s, see Cereals.						
vo	9	1 heaping t	**4.3**	**2.4**	**1.0**	35
			48.1	27.2	11.2	
, see Flours.						
e, ground . . .	75	½ c.	**56.6**	**8.3**	**1.3**	280
			75.5	11.1	1.7	
. . . .	30	½ c.	**21.7**	**3.2**	**0.8**	110
			72.7	10.8	2.5	
Sperry . . .	30	3 T.	**21.7**	**3.9**	**0.8**	110
			72.3	13.0	2.7	
. . . .	30	1 c.	**23.5**	**3.3**	**0.5**	110
			78.3	11.0	1.7	
cereal, N. B. C. .	30	½ c.	**21.2**	**4.2**	**0.6**	110
			70.8	14.0	2.0	
oked	60	2 oz.	**—**	**10.7**	**1.1**	55
			Trace	17.8	1.9	
. . . .	225	1 c.	**11.4**	**2.3**	**0.7**	65
			5.0	1.0	0.3	
" cream, see 32% . 664.						
. . . .	230	½ lb.		**52.7**	**15.0**	355
				22.9	6.5	
fried, av.	115	¼ lb.	**7.4**	**21.2**	**13.7**	245
			6.4	19.3	11.9	
steamed, av. . .	115	¼ lb.	**0**	**25.8**	**1.6**	115
			0	22.4	1.4	
. . . .	230	½ lb.		**43.7**	**2.3**	200
				19.0	1.0	
ied	115	¼ lb.	**8.0**	**19.9**	**11.8**	225
			*7.0	17.3	10.3	
eamed	115	¼ lb.		**22.9**	**1.0**	105
				19.9	0.9	
ries	100		**10.3**	**0.7**	**0.3**	75
			*10.3	0.7	3.0	
st	120	2, 7" x ¾"	**1.3**	**23.5**	**22.3**	310
			1.1	19.6	18.6	
heese	20	1 cu. in.	**0.5**	**6.8**	**3.9**	65
			*2.3	34.2	19.3	
n extract, Burnett, ...	5	1 t.	**0**	**0**	**0**	0
			0	0	0	
oiled	30	1 oz.	**—**	**5.3**	**0.8**	30
			Trace	17.6	2.6	
icory (French en-	45	1 sm. crown	**1.3**	**0.7**	**0.1**	9
			2.9	1.6	0.3	
hire sauce, Lea &	5	1 t.	**1.0**	**Trace**	**—**	4
			19.0	1.1	Trace	

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of portion: Carb.	Value of portion: Prot.	Value of portion: Fat
Y					
Yams, tubers, fresh	125	1, 5½" x 1½"	23.6 *18.7	2.6 2.1	0.3 [illegible]
Yautia (taniers, taye, cocoes)	100	1 tuber	25.5 *25.5	2.2 2.2	0.2 [illegible]
Yeast, ale, dried	10	2 t.	4.8 48.4	3.9 38.9	0.1 [illegible]
Yeast, brewer's, Mead	11	2 t.	4.3 39.0	4.2 48.0	0.2 [illegible]
Yeast, compressed, baker's	12	1½" sq.	2.5 21.0	1.4 11.7	— [illegible]
Yeast, Fleischmann	15	1 cake	1.2 *8.2	2.1 14.1	0.1 [illegible]
Yoghurt[1]	100	1 wine glass	9.4 9.4	7.4 7.4	7.2 7.2
Yoghurt cheese, American	30	2 T.		5.2 17.5	9.0 [illegible]
York cream cheese	25	2" x 1½" x 1"		4.5 17.9	1.6 6.5
Yorkshire pudding	50	1 sq.	13.4 *26.8	3.6 7.2	4.7 9.4
Z					
Zucchini	75	2½" x 2"	1.6 2.1	1.8 2.4	— —
Zwieback	5	1, 3" x 1¼"	3.7 73.5	0.5 9.8	0.5 9.9
Zwieback, Sunshine	7	1 piece	5.2 77.3	0.7 9.8	0.8 12.1
Zwieback toast, N. B. C.	7	1 piece	5.5 79.1	0.7 10.6	0.4 6.2

[1] Alcohol, 0.2 per cent.
* Largely assimilable.
Blank space indicates lack of data.
‡ Gross fat re
Negligible quantity is designate

SPECIAL DIETETIC AND COMMERCIAL FOODS

The table under this heading which appeared in previous edi has been deleted in view of the fact that it is now common cu for the manufacturers and distributors of special food products dietary adjuncts to state the analysis on the label. The numb such products has shown marked increase in recent years and trend is not likely to diminish. Changes also are frequently i duced into these preparations to keep them abreast of advar nutritional knowledge. Any table of practical size would o cessity be very incomplete and decidedly out-of-date from the of its printing. Where physicians or nutritionists wish to m camparisons of different brands or proprietary products they sh have no difficulty in assembling information on such preparat as are available locally.

dface **numerals** indicate the number of grams and the
an average portion. The plain numerals indicate the
composition thereof. *Italicized* letters indicate trade

TABLE 52.—**Strained Foods.**

ood items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.*	Prot.	Fat.	Cal.
d apricot	28.4	1 oz.	**4.9**	**0.1**	**0.1**	**22**
			17.5	0.3	0.5	
uce	28.4	1 oz.	**3.4**	**—**	**—**	**14**
			11.8	0.2	0.2	
reen	28.4	1 oz.	**0.8**	**0.3**	**—**	**5**
			2.9	1.1	0.1	
	28.4	1 oz.	**1.5**	**0.3**	**—**	**8**
			5.5	1.2	—	
	28.4	1 oz.	**1.7**	**0.1**	**—**	**8**
			5.9	0.4	0.2	
soup	28.4	1 oz.	**1.5**	**0.5**	**0.4**	**12**
			5.5	1.9	1.4	
l pudding	28.4	1 oz.	**4.9**	**0.7**	**0.6**	**28**
			17.4	2.4	2.1	
oup	28.4	1 oz.	**2.0**	**0.9**	**0.3**	**14**
			7.0	3.2	1.0	
s	28.4	1 oz.	**4.0**	**0.2**	**—**	**17**
			13.9	0.7	0.2	
	28.4	1 oz.	**3.3**	**0.1**	**0.1**	**14**
			11.6	0.3	0.4	
	28.4	1 oz.	**2.4**	**1.0**	**0.1**	**15**
			8.3	3.5	0.3	
pple pudding	28.4	1 oz.	**5.3**	**0.5**	**0.3**	**26**
			19.1	1.7	0.9	
s	28.4	1 oz.	**8.2**	**—**	**—**	**34**
			28.9	0.1	0.2	
h	28.4	1 oz.	**0.6**	**0.6**	**0.1**	**6**
			2.3	2.0	0.4	
toes with milk	28.4	1 oz.	**4.1**	**0.8**	**0.4**	**24**
			14.6	2.9	1.5	
able and beef	28.4	1 oz.	**2.3**	**0.6**	**0.3**	**15**
			8.1	2.3	1.2	
able and lamb	28.4	1 oz.	**2.3**	**0.5**	**0.3**	**14**
			8.2	1.7	1.1	
able soup	28.4	1 oz.	**2.3**	**0.4**	**—**	**11**
			8.1	1.3	—	
ables with bacon	28.4	1 oz.	**3.0**	**0.5**	**1.2**	**25**
			10.7	1.7	4.1	
ll Baby Soups:						
	28.4	1 oz.	**2.2**	**1.1**	**0.3**	**15**
			7.6	3.9	0.9	
ken	28.4	1 oz.	**1.8**	**0.7**	**0.4**	**14**
			6.4	2.6	1.5	
b	28.4	1 oz.	**2.0**	**0.9**	**0.6**	**17**
			7.2	3.1	2.1	
r	28.4	1 oz.	**2.1**	**1.0**	**0.3**	**15**
			7.5	3.4	0.9	
table	28.4	1 oz.	**2.6**	**0.6**	**0.1**	**14**
			9.3	2.0	0.5	

values exclude crude fiber. Negligible quantity is designated by —.
space indicates lack of data.

Food items.	Size of portion. Grams.	Household measure.	Value of portion Carb.*	Prot.	Fat
Clapp:					
Apple sauce	28.4	1 oz.	**4.6**	**0.4**	—
			16.2	1.5	0.1
Apricots and apples with farina	28.4	1 oz.	**4.4**	**0.2**	—
			15.5	0.8	0.1
Beans, green	28.4	1 0z.	**0.5**	**0.8**	—
			1.9	2.8	0.1
Carrots	28.4	1 oz.	**0.3**	**0.8**	—
			1.0	2.7	—
Chicken soup	28.4	1 oz.	**1.9**	**1.0**	0.4
			6.8	3.7	1.5
Custard pudding	28.4	1 oz.	**3.5**	**1.8**	0.4
			12.3	6.3	1.6
Liver soup	28.4	1 oz.	**1.6**	**1.5**	0.2
			5.6	5.3	0.7
Peaches	28.4	1 oz.	**3.1**	**0.5**	—
			10.8	1.9	—
Pears	28.4	1 oz.	**2.9**	**0.5**	—
			10.1	1.7	0.1
Peas	28.4	1 oz.	**0.8**	**1.7**	0.1
			3.0	5.9	0.3
Pineapple pudding	28.4	1 oz.	**3.8**	**0.6**	0.4
			13.5	2.2	1.5
Prunes	28.4	1 oz.	**5.4**	**0.7**	—
			19.2	2.5	—
Squash	28.4	1 oz.	**1.0**	**0.6**	0.1
			3.4	2.3	0.3
Vegetable soup	28.4	1 oz.	**2.1**	**0.7**	—
			7.4	2.4	Trace
Vegetables, creamed	28.4	1 oz.	**2.6**	**0.7**	0.4
			9.3	2.4	1.3
Vegetables, mixed	28.4	1 oz.	**2.4**	**0.6**	—
			8.4	2.0	0.1
Vegetables with bacon	28.4	1 oz.	**2.1**	**0.4**	0.6
			7.4	1.6	2.2
Vegetables with beef	28.4	1 oz.	**1.9**	**1.1**	0.2
			6.7	4.0	0.6
Vegetables with lamb	28.4	1 oz.	**1.7**	**1.1**	0.3
			6.2	3.8	1.0
Gerber:					
Apple sauce	28.4	1 oz.	**4.3**	—	—
			15.3	0.2	0.2
Apricots with farina	28.4	1 oz.	**5.6**	**0.2**	—
			20.0	0.7	0.2
Beans, green	28.4	1 oz.	**1.5**	**0.4**	—
			5.2	1.4	0.1
Beets	28.4	1 oz.	**2.2**	**0.4**	—
			7.7	1.3	0.1
Carrots	28.4	1 oz.	**1.6**	**0.2**	—
			5.7	0.6	0.1
Chocolate custard	28.4	1 oz.	**4.1**	**1.0**	1.1
			14.7	3.5	3.9
Custard pudding	28.4	1 oz.	**4.0**	**1.0**	1.0
			14.3	3.4	3.7
Liver soup	28.4	1 oz.	**1.8**	**1.1**	0.2
			6.5	3.8	0.7
Peaches	28.4	1 oz.	**3.5**	**0.2**	0.3
			12.4	0.5	0.9
Pear pineapple	28.4	1 oz.	**3.4**	**0.1**	—
			12.0	0.3	0.1
Pears	28.4	1 oz.	**3.4**	**0.1**	—
			12.2	0.4	0.2
Peas	28.4	1 oz.	**2.1**	**1.0**	0.1
			7.4	3.5	0.4

* All values exclude crude fiber.
Blank space indicates lack of data. Negligible quantity is designated by

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.*	Prot.	Fat.	Cal.
(cont.)						
	28.4	1 oz.	6.3	0.2	0.1	28
			22.6	0.8	0.3	
n	28.4	1 oz.	0.6	0.5	0.1	6
			2.2	1.8	0.4	
	28.4	1 oz.	1.9	0.2	—	9
			6.6	0.6	0.2	
ble and lamb	28.4	1 oz.	1.9	0.6	0.4	13
			6.6	2.1	1.5	
ble soup	28.4	1 oz.	2.0	0.6	0.4	14
			6.9	2.2	1.5	
bles, mixed	28.4	1 oz.	2.3	0.4	—	11
			8.0	1.5	0.1	
Meats:						
ed beef	28.4	1 oz.		4.9	1.1	29
				17.1	3.8	
ed liver	28.4	1 oz.		4.6	1.0	29
				16.2	3.6	
ed veal	28.4	1 oz.		4.4	0.7	24
				15.5	2.5	
e prune pudding	28.4	1 oz.	6.8	0.4	0.4	33
			24.5	1.5	1.3	
e sauce	28.4	1 oz.	3.6	—	—	15
			12.7	0.2	0.1	
cots and apple sauce	28.4	1 oz.	4.0	0.2	—	17
			14.4	0.6	0.1	
cots and oatmeal	28.4	1 oz.	6.5	0.3	0.1	28
			23.2	0.9	0.3	
s, green	28.4	1 oz.	1.1	0.6	—	7
			3.8	2.2	0.2	
and liver soup	28.4	1 oz.	1.8	1.2	0.6	18
			6.5	4.4	2.3	
broth with beef and arley	28.4	1 oz.	2.4	0.7	0.4	16
			8.3	2.5	1.6	
ts	28.4	1 oz.	2.4	0.4	—	12
			8.5	1.5	0.1	
rots	28.4	1 oz.	1.6	0.3	—	8
			5.7	1.0	0.2	
eal for infants, recooked, dry	28.4	1 oz.	20.5	4.3	0.6	104
			72.1	15.1	2.2	
stard pudding	28.4	1 oz.	5.8	0.7	0.4	30
			20.6	2.6	1.5	
nge pudding	28.4	1 oz.	6.1	0.5	—	27
			21.8	1.7	0.2	
aches	28.4	1 oz.	5.7	0.1	—	24
			20.5	0.4	0.2	
ars and pineapple	28.4	1 oz.	3.8	0.1	—	16
			13.7	0.4	0.1	
ars with farina	28.4	1 oz.	6.2	0.2	—	26
			22.0	0.6	0.1	
as	28.4	1 oz.	2.5	1.4	0.2	17
			8.8	4.9	0.5	
unes	28.4	1 oz.	9.0	0.3	—	34
			28.2	1.1	0.2	
inach	28.4	1 oz.	0.4	0.6	0.1	5
			1.5	2.2	0.5	
omato juice	28.4	1 oz.	1.2	0.3	—	6
			4.4	1.0	0.1	
omato soup	28.4	1 oz.	3.1	0.6	—	16
			11.2	2.3	0.1	
egetable soup	28.4	1 oz.	2.5	0.5	—	12
			8.7	1.8	0.1	
egetables and lamb	28.4	1 oz.	1.9	0.6	0.4	13
			6.8	2.0	1.3	

Food items.	Size of portion. Grams.	Size of portion. Household measure.	Value of [illegible] Carb.*	Prot.	[illegible]
Libby "Homogenized":					
Apple sauce	28.4	1 oz.	**6.1**	—	—
			21.4	0.2	0.2
Apples and apricots	28.4	1 oz.	**4.6**	**0.1**	—
			16.4	0.4	[illegible]
Apples and prunes	28.4	1 oz.	**6.0**	**0.1**	—
			21.3	0.4	0.4
Apricot-farina	28.4	1 oz.	**5.3**	**0.3**	—
			18.8	0.9	Trace
Beans, green	28.4	1 oz.	**1.1**	**0.4**	—
			3.9	**1.4**	Trace
Beets	28.4	1 oz.	**2.4**	**0.4**	—
			8.4	1.5	—
Carrots	28.4	1 oz.	**2.0**	**0.2**	—
			7.2	0.7	Trace
Custard pudding	28.4	1 oz.	**6.6**	**1.0**	**1.0**
			23.4	3.7	3.4
Fruits, mixed (apricots, peaches, pears)	28.4	1 oz.	**4.8**	**0.2**	—
			17.1	0.5	0.2
Liver soup	28.4	1 oz.	**2.2**	**1.1**	—
			7.8	3.9	0.2
Peaches	28.4	1 oz.	**4.2**	**0.2**	—
			15.0	0.6	0.1
Pears and pineapple	28.4	1 oz.	**4.1**	**0.1**	—
			14.7	0.4	0.1
Peas	28.4	1 oz.	**1.9**	**0.8**	—
			6.7	2.9	0.2
Prunes with pineapple and lemon juices	28.4	1 oz.	**7.4**	**0.3**	—
			26.4	1.1	0.2
Spinach	28.4	1 oz.	**0.5**	**0.5**	**0.2**
			1.7	1.7	0.5
Squash	28.4	1 oz.	**1.8**	**0.2**	—
			6.3	0.8	Trace
Vegetable soup	28.4	1 oz.	**2.6**	**1.2**	—
			9.3	4.1	Trace
Vegetables, garden (carrots, peas, spinach)	28.4	1 oz.	**1.7**	**0.5**	—
			5.9	1.8	Trace
Vegetables, mixed (green beans, pumpkin, tomato)	28.4	1 oz.	**1.2**	**0.3**	—
			4.3	1.0	Trace
Vegetables with bacon	28.4	1 oz.	**2.4**	**0.4**	**0.9**
			8.5	1.6	3.2
Vegetables with beef	28.4	1 oz.	**1.7**	**1.2**	—
			6.1	4.1	Trace
Vegetables with lamb	28.4	1 oz.	**2.2**	**1.0**	**0.8**
			7.6	3.7	2.8
Swift's Meats:					
Strained beef	28.4	1 oz.		**5.0**	**0.8**
				17.7	3.0
Strained heart	28.4	1 oz.		**3.8**	**0.7**
				13.4	2.5
Strained lamb	28.4	1 oz.		**4.4**	**1.3**
				15.6	4.5
Strained liver	28.4	1 oz.		**4.5**	**1.2**
				15.9	4.3
Strained pork	28.4	1 oz.		**4.7**	**1.6**
				16.7	5.6
Strained veal	28.4	1 oz.		**4.6**	**0.3**
				16.4	1.0

* All values exclude crude fiber.
Blank space indicates lack of data. Negligible quantity is designated by [illegible]

CHOPPED OR JUNIOR FOODS

boldface numerals indicate the number of grams and the cal- an average portion. The plain numerals indicate the per- composition thereof. *Italicized* letters indicate trade names.

TABLE 53.—**Chopped or Junior Foods.**

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.*	Prot.	Fat.	Cal.
at:						
., green	28.4	1 oz.	**1.3**	**0.4**	**—**	**7**
			4.7	1.3	0.1	
	28.4	1 oz.	**1.6**	**0.4**	**—**	**8**
			5.6	1.4	—	
ts	28.4	1 oz.	**2.2**	**0.2**	**—**	**10**
			7.8	0.8	0.1	
ken soup	28.4	1 oz.	**1.5**	**0.9**	**0.5**	**14**
			5.5	3.2	1.7	
apple rice pudding	28.4	1 oz.	**5.6**	**0.5**	**0.3**	**27**
			19.9	1.8	1.1	
nes	28.4	1 oz.	**8.0**	**0.3**	**—**	**33**
			28.0	1.0	0.1	
sin-rice pudding	28.4	1 oz.	**7.2**	**0.7**	**0.4**	**35**
			25.3	2.4	1.5	
nach	28.4	1 oz.	**0.7**	**0.6**	**0.1**	**6**
			2.4	2.1	0.4	
etable and beef	28.4	1 oz.	**2.5**	**1.0**	**0.2**	**16**
			8.8	3.4	0.8	
getable and lamb	28.4	1 oz.	**2.6**	**0.6**	**0.3**	**16**
			9.3	2.3	1.1	
getable soup	28.4	1 oz.	**2.6**	**0.3**	**—**	**12**
			9.4	1.2	0.1	
getables with bacon	28.4	1 oz.	**2.8**	**0.4**	**1.0**	**22**
			9.9	1.5	3.5	
:						
ple sauce	28.4	1 oz.	**3.8**	**0.4**	**—**	**17**
			13.5	1.6	0.1	
ricots with farina	28.4	1 oz.	**2.8**	**0.7**	**—**	**14**
			9.9	2.4	Trace	
by cereal	28.4	1 oz.	**21.7**	**3.4**	**0.1**	**102**
			76.4	12.0	0.5	
by oatmeal	28.4	1 oz.	**21.2**	**4.0**	**0.3**	**103**
			74.6	14.2	1.2	
rrots	28.4	1 oz.	**0.4**	**1.0**	**—**	**6**
			1.3	3.5	0.1	
icken soup	28.4	1 oz.	**2.4**	**0.5**	**—**	**12**
			8.3	1.9	0.1	
ocolate pudding	28.4	1 oz.	**3.6**	**0.8**	**0.2**	**20**
			13.0	3.0	0.6	
sh chowder	28.4	1 oz.	**2.2**	**0.5**	**—**	**11**
			7.6	1.8	0.2	
aches	28.4	1 oz.	**3.0**	**0.6**	**0.1**	**15**
			10.7	2.0	0.3	
ars	28.4	1 oz.	**3.0**	**0.5**	**—**	**15**
			10.7	1.8	0.2	
neapple pudding	28.4	1 oz.	**3.0**	**1.0**	**0.4**	**20**
			10.7	3.5	1.5	

l values exclude crude fiber.
k space indicates lack of data.

Negligible quantity is designated by —.

Food items.	Size of portion. Grams.	Household measure.	Value of … Carb.*	Prot.	Fat
Clapp: (cont.)					
Prunes	28.4	1 oz.	**5.5**	**0.8**	—
			19.5	2.7	0.1
Spinach	28.4	1 oz.	—	**0.8**	**0.1**
			0.1	2.9	0.3
Vegetable soup	28.4	1 oz.	**2.3**	**0.3**	—
			8.1	1.2	Trace
Vegetables, creamed	28.4	1 oz.	**1.8**	**0.8**	**0.4**
			6.5	2.7	1.3
Vegetables with bacon	28.4	1 oz.	**2.6**	**0.4**	**0.5**
			9.3	1.6	1.9
Vegetables with beef	28.4	1 oz.	**2.3**	**0.8**	**0.3**
			8.0	3.0	0.9
Vegetables with lamb	28.4	1 oz.	**2.4**	**0.6**	**0.1**
			8.4	2.2	0.4
Vegetables with liver	28.4	1 oz.	**1.8**	**0.8**	—
			6.5	2.8	Trace
Gerber:					
Apple prune pudding	28.4	1 oz.	**6.6**	**0.4**	**0.1**
			23.1	1.3	0.5
Beans, green	28.4	1 oz.	**1.2**	**0.4**	—
			4.2	1.3	0.1
Carrots	28.4	1 oz.	**1.6**	**0.2**	—
			5.6	0.6	0.2
Peaches	28.4	1 oz.	**4.5**	**0.1**	—
			16.2	0.5	0.1
Pineapple-rice pudding	28.4	1 oz.	**6.6**	**0.5**	**0.1**
			23.1	1.7	0.5
Spinach	28.4	1 oz.	**0.7**	**0.6**	**0.1**
			2.5	2.1	0.4
Vegetables and beef	28.4	1 oz.	**2.1**	**0.7**	**0.3**
			7.4	2.4	1.1
Vegetables and lamb	28.4	1 oz.	**2.3**	**0.6**	**0.4**
			7.9	2.0	1.4
Vegetables and liver	28.4	1 oz.	**2.0**	**0.6**	**0.1**
			7.3	2.1	0.3
Gerber's Meats:					
Chopped beef	28.4	1 oz.		**6.8**	**0.7**
				23.8	2.5
Chopped liver	28.4	1 oz.		**6.9**	**1.4**
				24.2	5.1
Chopped veal	28.4	1 oz.		**6.6**	**0.5**
				23.2	1.7
Heinz:					
Apple, fig and date dessert	28.4	1 oz.	**6.1**	**0.2**	**0.2**
			21.8	0.6	0.5
Chicken farina vegetable porridge	28.4	1 oz.	**2.0**	**0.8**	**0.2**
			7.1	2.9	0.6
Chopped carrots	28.4	1 oz.	**1.2**	**0.3**	—
			4.4	0.9	0.1
Chopped green beans	28.4	1 oz.	**1.3**	**0.4**	—
			4.5	1.3	0.2
Chopped mixed vegetables	28.4	1 oz.	**2.2**	**0.2**	—
			7.7	0.8	0.1
Chopped spinach	28.4	1 oz.	**0.5**	**0.5**	—
			1.7	1.8	0.2
Creamed diced vegetables	28.4	1 oz.	**2.5**	**0.6**	**0.3**
			8.8	2.1	1.2
Creamed tomato and rice	28.4	1 oz.	**6.0**	**0.6**	**0.6**
			11.4	2.1	2.2

* All values exclude crude fiber.
Blank space indicates lack of data. Negligible quantity is designated by

Food items. (ont.)	Size of portion. Grams.	Household measure.	Value of portion. Carb.*	Prot.	Fat.	Cal.
le rice pudding	28.4	1 oz.	**7.8**	**0.5**	**—**	**34**
			27.5	1.7	0.2	
udding	28.4	1 oz.	**7.2**	**0.6**	**0.3**	**33**
			25.2	2.0	0.9	
les with lamb and						
. . . . . .	28.4	1 oz.	**2.5**	**0.9**	**0.4**	**18**
			8.8	3.1	1.6	
eats:						
eef	28.4	1 oz.		**6.5**	**1.1**	**37**
				23.1	4.1	
heart	28.4	1 oz.		**4.8**	**1.4**	**33**
				17.3	5.1	
lamb	28.4	1 oz.		**5.1**	**1.8**	**37**
				18.2	6.3	
liver	28.4	1 oz.		**5.3**	**1.5**	**35**
				18.7	5.2	
pork	28.4	1 oz.		**6.2**	**2.0**	**43**
				22.1	7.1	
veal	28.4	1 oz.		**5.7**	**0.6**	**28**
				20.4	2.1	

TABLE 54.—Pre-cooked Baby Cereals.

Food items.	Size of portion. Grams.	Household measure.	Value of portion. Carb.†	Prot.	Fat.	Cal.
cereal	28.4	1 oz.	**21.7**	**3.4**	**0.1**	**102**
			76.4	12.0	0.5	
oatmeal	28.4	1 oz.	**21.2**	**4.0**	**0.3**	**103**
			74.6	14.2	1.2	
ey cereal	28.4	1 oz.	**19.6**	**3.7**	**1.4**	**108**
			69.2	13.2	4.9	
al food	28.4	1 oz.	**20.4**	**4.1**	**1.0**	**110**
			71.9	14.6	3.4	
ined oatmeal	28.4	1 oz.	**18.6**	**4.2**	**2.0**	**112**
			65.6	14.7	7.3	
al for infants	28.4	1 oz.	**20.5**	**4.3**	**0.6**	**104**
			72.1	15.1	2.2	
neal	28.4	1 oz.	**18.1**	**4.8**	**1.5**	**108**
			63.9	16.8	5.5	

l values exclude crude fiber.
xclusive of crude fiber which ranges from 1.0 to 1.9 per cent on the products

RECIPED FOODS.†

Reciped foods have not been included in the main table of fo[...] nutrients unless subject to rigid commercial control or actua[...] analyzed after "home" preparation. To complete such data t[...] items in Table 55 have been calculated from standard recip[...] utilizing the analyses of the component parts. The data, wh[...] applied to specific instances, must be regarded as merely appro[...]imate.

Recipes from two sources have been incorporated in the followi[...] table: (1) Certain foods are shown with appended caloric ingre[...]ents for which the recipes are common knowledge; (2) all oth[...] items follow the recipes given in The Boston Cooking School Co[...] Book by Fannie Merritt Farmer, 1936 revised edition, Litt[...] Brown and Company, Boston.

The calories have been entered in the nearest multiple of 5.

Italicized numbers in parentheses indicate the number of servin[...] per recipe.

Table 55.—**Nutritive Value of Some Common Foods, Prepared According to Recipe.**

Food items.	Size of portion, household measure.	Value of portion. Carb.	Prot.	Fat.	C[...]
Albumen water	1 c.	—	4.5	Trace	
1 egg white					
Albumenized fruit juice	1 c.	4.5	4.5	Trace	
¼ c. orange juice					
added to albumen water					
Beef, creamed chipped on toast (*3*) .	½ c. on 1 sl. toast	21.0	11.0	13.5	2[...]
½ c. dried beef					
1 c. white sauce II					
Biscuits, baking powder (*20*) . .	1 biscuit	11.0	2.0	2.0	
Broth	1 c.	0.1	5.0	—	
Bouillon	1 c.	0.7	6.2	0.2	
Cakes:					
Chocolate (*16*)	1 piece	26.0	3.0	5.5	1[...]
2 T. cocoa added to plain cake					
Corn (Johnny cake) (*15*) . . .	1 piece	19.0	3.0	1.5	1[...]
¾ c. cornmeal					
1¼ c. white flour					
¼ c. sugar					
5 t. baking powder					
1 c. milk					
1 egg					
2 T. butter					

† From the Dietary Department of the New York Post-Graduate Hospital.
Blank space indicates lack of data. Negligible quantity is designated by [...]

Food items.	Size of portion, household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
read (*20*) iolasses white flour utter	1 piece	24.5	2.0	3.0	135
16) utter ugar s nilk white flour baking powder	1 piece	26.0	3.0	5.0	165
g:					
ate (*16*) z. chocolate added to n icing	2 T.	15.0	0.5	1.5	80
(*16*) sugar gwhite	2 T.	14.5	0.5	—	60
ruel (*2*) ereal	1 c.	6.5	1.5	1.0	40
cream (*2*) . light cream added to eal gruel	1 c.	8.0	2.5	6.5	105
milk (*2*) . milk added to eal gruel	1 c.	9.5	3.5	3.0	80
water (*2*) T. cereal	1 c.	3.3	0.7	0.5	20
n, creamed	½ c.	6.0	11.0	16.5	225
ate syrup (*8*) cocoa sugar	2 T.	11.5	1.0	1.0	60
all milk	1 c.	17.0	7.0	8.5	180
half milk	1 c.	12.0	4.0	5.0	110
cream	1 c.	17.5	1.0	12.0	210
s, plain (*50*) utter sugar milk s white flour aking powder	1	10.5	1.0	2.0	65
l:					
d (*8*)	1 custard c.	20.5	8.0	8.0	190
(*4*)	½ c.	21.0	6.0	8.5	190
 gg easpoons sugar . milk	1 c.	18.0	12.0	11.5	230
et (*2*)	Individual	1.5	14.5	24.5	295
nbled (*3*)	½ c.	2.0	0.5	3.5	45

Food items.	Size of portion, household measure	Value of portion			
		Carb	Prot	Fat	[illegible]
Gelatin, lemon flavor (*8*)	½ c.	30.0	2.0	—	[illegible]
Gravy, brown (*8*)	2 T.	2.0	0.5	3.5	[illegible]
Ice, orange (*12*)	½ c.	42.5	0.6	0	17[illegible]
Junket (*2*) 1 c. milk 1 T. sugar	½ c.	13.5	4.0	5.0	12[illegible]
Lemonade (*5*)	1 c.	24.5	0	0	10[illegible]
Macaroni and cheese (*5*) ¾ c. uncooked macaroni ½ c. grated cheese 1 T. white flour 1½ T. butter 3 T. bread crumbs	1 c.	24.0	9.0	14.0	265
Milk:					
Chocolate malted 2 T. chocolate syrup added to malted milk	1 c.	37.5	9.5	8.0	270
Malted ¾ c. milk 3 T. malted milk	1 c.	26.0	8.5	7.0	205
Mousse, vanilla (*5*)	½ c.	10.5	2.0	18.0	220
Muffins:					
Cornmeal (*8*)	1 large	22.0	4.0	3.0	135
Plain (*10*)	1	24.0	4.5	3.5	150
Potatoes:					
Creamed (*6*)	½ c.	14.5	4.0	12.0	190
Scalloped (*6*) 4 med. potatoes 1 T. white flour 1 T. butter 1 c. milk	½ c.	15.0	3.0	4.0	110
Hashed brown (*4*)	½ c.	15.5	2.0	10.5	170
Mashed (*6*)	½ c.	27.0	3.5	7.0	190
Prune whip (*8*)	½ c.	18.0	3.0	Trace	85
Puddings:					
Bread (*12*)	½ c.	33.0	10.5	10.0	270
Butterscotch (*6*)	½ c.	33.0	4.0	5.5	20[illegible]
Chocolate bread (*12*) ¾ c. cocoa added to bread pudding	½ c.	36.0	12.5	13.0	32[illegible]
Chocolate cornstarch (*2*) ½ oz. chocolate, or 3 T. cocoa, added to cornstarch pudding	½ c.	31.0	6.5	8.0	23[illegible]
Cornstarch (*2*)	½ c.	26.5	4.0	5.0	17[illegible]
Rice (*7*)	½ c.	29.0	5.5	5.5	19[illegible]

Blank space indicates lack of data. Negligible quantity is designated by —

Food items.	Size of portion, household measure.	Value of portion. Carb.	Prot.	Fat.	Cal.
stard (4)	½ c.	29.0	5.0	6.0	195
oked rice					
ilk					
itter					
ugar					
aisins					
(6)	½ c.	19.5	5.0	5.0	145
(4)	½ cup on 2 lettuce leaves	1.5	9.5	16.0	195
w (2)	½ c.	3.5	1.0	8.5	100
hredded cabbage					
cream dressing					
. . . .	1 c.	13.0	0.5	18.0	225
cream dressing					
h fruit as desired					
. . . .	1 c.	3.0	1.0	20.0	200
salad greens					
. French dressing					
o (4)	½ c. on 2 lettuce leaves	8.0	3.5	13.5	175
on (3)	½ c. on 2 lettuce leaves	0.5	17.5	23.5	295
. salmon					
. diced celery					
gg					
ettuce leaves					
T. mayonnaise					
lorf (6)	½ c. on 2 lettuce leaves	5.5	3.5	22.5	245
dressings:					
m mayonnaise (8)	1 T.	0.2	0.1	9.0	85
. mayonnaise					
T. whipped cream					
ian (8)	1 T.	1.5	0.3	8.0	85
. mayonnaise					
T. cream					
T. chili sauce					
, creamed	½ c. on 1 sl. of toast	22.0	11.0	17.0	295
iches:					
se	1 sandwich	26.0	12.0	22.0	360
l. bread					
. butter					
l. cheese					
ttuce					
. mayonnaise					
. . . .	1 sandwich	26.0	10.5	19.5	330
l. bread					
. butter					
gg					
ttuce					
. mayonnaise					

Food items.	Size of portion, household measure.	Value of [illegible]			
		Carb.	Prot.	F[illegible]	[illegible]
Sandwiches:					
Marmalade	1 sandwich	47.0	4.0	9.5	2[illegible]
2 sl. bread					
2 t. butter					
1 t. marmalade					
Meat or fish	1 sandwich	26.0	12.0	15.5	3[illegible]
2 sl. bread					
2 t. butter					
1 oz. meat or fish					
Lettuce					
1 t. mayonnaise					
Vegetable, 3 per cent	1 sandwich	29.0	4.0	14.0	28[illegible]
2 sl. bread					
2 t. butter					
3 per cent vegetable					
1 t. mayonnaise					
Sauces:					
Caramel *(8)*	2 T.	28.5	—	—	115
Chocolate fudge *(12)*	2 T.	32.0	3.0	6.0	20[illegible]
Custard	4 T.	10.5	3.0	4.5	10[illegible]
Hard *(8)*	2 T.	44.0		8.0	255
Tomato, thin	¼ c.	4.0	1.0	3.5	5[illegible]
Vanilla	2 T.	30.0	—	6.5	18[illegible]
White I, thin (soup base)	⅓ c.	5.5	3.0	7.5	10[illegible]
White II, medium (creamed foods)	2 T.	3.0	1.0	4.5	6[illegible]
White III, thick (sauces)	2 T.	4.0	1.5	6.0	8[illegible]
Tomatoes, scalloped *(2)*	½ c.	9.5	2.0	5.0	9[illegible]
1 c. tomatoes					
½ sl. bread					
½ t. sugar					
2 t. butter					
Toast, milk *(6)*	1 sl.	19.5	5.0	8.0	17[illegible]
Vegetables, creamed:					
Creamed 3 per cent vegetable	½ c.	6.0	1.5	4.5	7[illegible]
2 T. white sauce II					
½ c. 3 per cent vegetable					
Creamed 6 per cent vegetable	½ c.	9.0	1.5	4.5	8[illegible]
2 T. white sauce II					
½ c. 6 per cent vegetable					
Creamed 9 per cent vegetable	½ c.	12.0	1.5	4.5	10[illegible]
2 T. white sauce II					
½ c. 9 per cent vegetable					
Creamed 12 per cent vegetable	½ c.	15.0	1.5	4.5	11[illegible]
2 T. white sauce II					
½ c. 12 per cent vegetable					
Creamed 15 per cent vegetable	½ c.	18.0	1.5	4.5	12[illegible]
2 T. white sauce II					
½ c. 15 per cent vegetable					

Blank space indicates lack of data. Negligible quantity is designated by

ction.—Increasing interest is attached to the presence or of specific chemical entities in food. Although the infor- now in hand leaves much to be desired, available data useful, if somewhat limited, information.

Available Carbohydrates.

e preceding tables an effort has been made to designate ble carbohydrates by the use of an asterisk on the per- value. It is recognized that this does not represent true lity in every instance. The complex nature of naturally- ng carbohydrates renders the problem a difficult one, affected y by lack of chemical data but by modes of cooking and ces in digestibility. Table 56, therefore, provides desirable garding a restricted group of foods.

analyses shown in Table 56 are from E. M. Widdowson and McCance (*Biochem. Jour.*, **29**, 151, 1935). McCance and his kers have made outstanding contributions to our knowledge chemical composition of foodstuffs. Further analyses on rbohydrates of various classes of foods will be found in l Report No. 213 of the Medical Research Council of Great n (1936). The total carbohydrate available in stewed fruit from that which may be added) is as follows: apples 4.4, apricots 18, blackberries 3.2, cherries 4.1,[1] black currants 4.6, rrants 3.2, damsons 6.6,[1] dried figs 30, gooseberries 1.7, green 7.6,[1] dried peaches 18, pears 6.5, plums 6.1,[1] dried prunes raspberries 3.8, and rhubarb 0.7 grams per 100 grams.

ABLE 56.—**Available Carbohydrates in Fruits and Vegetables.**

Food items.	*Sugar, per cent.*	*Total available carbohydrate, per cent.*	*Water content, per cent.*
s, baked	12.0		
b	12.6		81.1
b, juice	11.2		85.0
pire, eating*		12.2	84.1
glish, cooking*		9.6	85.6
glish, eating*		11.7	84.5
l	10.4		85.4
orge Washington	12.7		
rthern Spy	14.0		
nmer	9.4		86.5
nter	11.2		83.6
e juice	10.5		87.1
ots, American	10.4		85.4

eighed with stones. * Flesh only: no skin.

Food items.	*Sugar per cent.*	*Total available carbohydrate, per cent.*	*Water content, per cent.*
Apricots, English		6.7	[illegible]
Asparagus, boiled	0.8		
Asparagus-beans, green pods		7.8	84.[illegible]
Avocados, Fuerte	0.6		65.[illegible]
Bananas		19.2	74.[illegible]
Very green	1.8		
Green	5.8	21.4	
Medium ripe	15.4		
Very ripe	18.2	18.9	
Beans, lima, canned	1.6		
Beans, snap		2.6	88.9
Beans, string, green, raw	3.4		91.4
Beans, string, boiled	1.5		94.6
Beet greens	0.5		90.4
Blackberries	6.1		85.3
Blackberry juice	5.4		92.3
Blueberries	9.7		83.4
Blueberry juice	12.4		85.9
Broccoli	1.9		89.9
Burdock root		7.6	72.4
Cabbage		5.1	92.4
Cabbage, boiled	1.1		96.6
Cabbage, raw	4.9	5.8	91.5
Cabbage, Chinese		1.1	95.2
Cantaloupe		5.3	93.6
Carrots		7.6	88.2
Carrots, boiled	3.7		
Carrots, raw	8.7	9.0	88.2
Cauliflower, boiled once	1.7		93.9
Cauliflower, boiled "thrice"	0.7	0.8	95.0
Cauliflower, raw	1.9	2.9	92.6
Celeriac		0.9	88.3
Celery		1.3	93.7
Celery hearts, raw	1.9		
Celery, outside portion, raw	0.5	0.6	95.2
Celery, outside portion, cooked	0.3	0.4	96.7
Chard, leaves		0.9	91.0
Chard, stalks		1.8	95.[illegible]
Cherries, American, sour	9.5		84.[illegible]
Cherries, American, sweet	11.6		80.[illegible]
Cherries, English, cooking	11.6		79.[illegible]
Cherries, English, eating	11.9		81.[illegible]
Corn, young		13.9	80.[illegible]
Corn, medium		20.1	72.[illegible]
Corn, old		24.8	65.[illegible]
Cranberries, American	4.2		87.[illegible]
Cranberries, English		3.5	87.[illegible]
Cucumber	2.6		96.[illegible]

ood items.	Sugar, per cent.	Total available carbohydrate, per cent.	Water content, per cent.
s, black		6.6	77.4
s, red		4.4	82.8
s, white		5.6	83.3
juice, black	10.9		
juice, red	6.2		89.1
plums, American	8.7		78.8
plums, English		9.6	77.5
ion greens		0.9	85.8
ns		23.5	66.6
		63.9	14.6
r sorrel		0.1	93.3
	16.2		78.0
reen		9.5	84.6
erries, green		3.4	89.9
erries, ripe		9.2	83.7
fruit		5.3	90.7
fruit	6.5		88.8
fruit juice	6.8		89.7
s, American	11.5		81.9
ck*		15.5	80.7
ropean	14.9		81.6
laga	22.5		
ite		16.1	79.3
e juice:			
tawba type	17.9		79.1
ncord	15.7		82.1
laware	19.9		77.3
ropean	19.8		77.1
uscadine	12.5		86.7
ngage plums		11.8	78.2
as, common	6.1		80.6
as, strawberry	6.7		79.3
		1.4	86.6
lrabi	2.2		90.1
bsquarters		1.7	84.2
s		4.0	88.2
on		3.2	85.2
on	2.2		89.3
on juice		1.6	91.3
uce, green leaves	0.9		
uce, white leaves	1.7		94.8
es	0.5		86.0
es, sweet	6.0		89.6
e juice	0.3		91.3
anberries, American	6.0		82.9
anberries, English		3.4	85.0
anberry juice	5.5		88.9

* ··sh only; no skin.

Food items.	Sugar, *per cent.*	Total available carbohydrates, per cent.	[illegible]
Mandarin orange	8.7		87
Mandarin orange juice	7.8		89
Mangos	13.7		81
Melons, yellow, English		5.0	94
Mulberries		8.1	85
Muskmelon	5.4		92
Muskmelon juice	9.1		87
Nectarines	11.8		82
Oca, tubers		14.7	80
Oranges		8.5	86
Oranges, Seville	6.0		87
Orange juice		9.4	87
Orange juice	6.8		
Onions, average		7.2	87.
Onions, boiled	6.1		
Onions, raw	8.3		
Onions, young green		4.2	87.
Papaya	9.0		88.
Parsley	2.8		87
Parsnips, raw		11.9	78.
Peaches, English		9.1	86.
Georgia	9.4		85.
Maryland	8.6		87.
New Jersey	7.6		88.
North Carolina	9.2		86.
Peach juice	11.8		86.
Pears, Bartlett	8.3		83.
Empire eating*		10.8	83.
English cooking*		10.4	83.
English eating*		9.3	83.
Winter	11.9		
Peas, green, young		7.2	81.
Peas, green, medium		9.0	75.
Peas, green, old		14.6	65.
Peas, green, boiled	2.8		
Peppers, green		5.9	92.
Peppers, red	3.0		89.
Persimmons, Japanese	15.9		78.
Persimmons, native American	18.9		64
Pineapple, fresh		11.6	84.
Pineapple juice	11.8		86.
Plantains	25.3		64.
Plums, American	8.3		85.
Plums, English cooking		6.2	85
Plums, English dessert		9.6	85
Pomegranate, pulp with seeds	11.9		75
Pomegranate juice		11.6	85

* Flesh only; no skin.

od items.	Sugar, per cent.	Total available carbohydrate, per cent.	Water content, per cent.
sweet	5.4	25.6	68.5
white		24.4	78.3
white, boiled		17.8	
		5.1	90.5
	9.1		85.3
uice	6.3		
	3.4		93.6
ies, American black	7.9		80.7
an black, juice	7.6		88.4
an red	7.2		83.4
can red, juice	7.3		90.8
h		5.6	83.2
	0.4		94.9
gas	6.7		89.1
ns, green, shelled		4.6	64.7
	0.3		92.7
, New Zealand	0.9		91.4
raw, cushaw		5.1	90.4
summer		1.4	95.0
winter		4.9	88.6
d once	2.9		93.7
d thrice	2.6		94.0
	5.0		91.1
erries, American	5.3		90.0
erries, American, medium ripe	4.1		
erries, English		6.2	88.9
erry juice	3.6		94.2
		19.6	75.1
ines	8.7		87.3
ine juice	7.8		89.2
oes, ripe, American, raw		3.5	94.1
, American, boiled		2.5	
, American, canned		3.3	
, English		2.8	
n		1.6	94.7
s	4.6		90.9
nelon	6.0		92.1
		18.7	72.6

Table 57.—Crude Fiber Content of Some Foods.

Those items designated *mws* show analyses by R. A. McCance, E. M. W[illegible] and L. R. B. Shackleton on foods purchased in Great Britain (Medical [illegible] Council Special Report No. 213, 1936). Otherwise analytical data [illegible] largely from U. S. Department of Agriculture Circulars 50 and 146. An asterisk [illegible] denotes that the figure is based on the weight of raw material contained in [illegible] serving of ½ cup; data in part from J. L. Kantor and L. F. Cooper (Arch. [illegible] *Med.*, 10, 965, 1937). A double dagger indicates that the analyses were [illegible] F. C. Hummel, M. L. Shepherd, I. G. Macy (*Jour. Am. Dietet. Assn.* 16, [illegible] the figure in parenthesis represents the *percentage* of the total fiber in the [illegible] highly indigestible lignin. It will be noted that the English values for [illegible] carbohydrate are consistently higher than the others.

Food items.	*Size of portion.* Grams.	*Size of portion.* Household measures.	Fiber. Per cent.	Fiber. Grams per portion.
Almond butter	15	1 T.	3.9	0.58
Meal	25	2 T.	2.9	0.73
Paste	10	1 t.	7.8	0.78
Almonds	30	20	3.0	0.90
mws	30	20	12.0	3.60
Apple, fig and date dessert, Heinz	60	2 oz.	1.0	0.60
Apple powder	8	1 T.	6.7	0.54
Sauce	135	½ c.	0.8	1.08
Sauce, strained, canned	135	½ c.	0.5	0.68
Apples	130	1, 2½″ diam.	1.0	1.30
Apples‡	130	1, 2½″ diam.	0.8 (27)	1.04
Eating, *mws*	130	1, 2½″ diam.	2.2	2.86
Cooking, *mws*	130	1, 2½″ diam.	2.4	3.12
Baked, canned	120	1, 2½″ diam.	0.7	0.84
Apricots	50	2 med.	0.6	0.30
mws	50	2 med.	2.1	1.05
Canned	70	3 halves	0.5	0.35
mws	70	3 halves	1.3	0.91
Strained, canned	15	1 T.	0.6	0.09
Dried	10	1 T.	3.2	0.32
mws	10	1 T.	24.0	2.40
Artichokes, globe	50	1 lg.	3.2	1.60
Jerusalem	100	1 lg.	0.8	0.80
Asparagus	75	6, 6″ stalks	0.7	0.52
Boiled, *mws*	75	5 spears	1.5	***
*** Only 50 per cent of cooked weight is edible.				
Tips, canned	75	5 spears	0.6	0.45
Strained, canned	14	1 T.	0.5	0.07
Avocados, av.	85	½, 3½″ long	1.4	1.19
mws	85	½, 3½″ long	2.0	1.70
Bamboo shoots	100	¾ c.	0.8	0.80
Banana powder	8	1 T.	3.3	0.26
Bananas	100	1 sm.	0.6	0.60
mws	100	1 sm.	3.4	3.40
Ripe‡	100	1 sm.	0.8 (60)	0.80
Barley, pearled	30	3 T.	0.3	0.09
Bean soup	250	1 c.	0.4	1.00
Bean sprouts	65	½ c.	1.0	0.65
Beans, baked	250	1 c.	1.4	3.50
mws	250	1 c.	5.1	12.75
canned	250	1 c.	1.0	2.50
Broad, green, shelled	75	½ c.	2.0	1.50
Broad, boiled, *mws*	125	½ c.	4.2	5.25
Butter, boiled, *mws*	100	½ c.	5.1	5.10
Lima, green	60	½ c.*	1.5	0.90
Canned	130	½ c.	1.2	1.56
Baby, canned	130	½ c.	1.0	1.30
String	75	½ c.*	1.4	1.05
Small, whole stringless, canned	100	½ c.	0.4	0.40

	Size of portion.		Fiber.	
d items.	Grams[1]	Household measures.	Per cent.	Grams per portion.
, green, canned	14	1 T.	1.0	0.14
navy	75	½ c.	4.4	3.30
	100	½ c.	4.6	4.60
iver soup, Heinz	30	1 oz.	0.2	0.06
t) hash, canned	230	½ lb.	0.3	0.69
, canned	115	¼ lb.	0.3	0.35
ns	75	½ c.*	1.4	1.05
	75	½ c.*	0.9	0.68
mws	75	½ c.	2.5	1.87
d, canned	15	1 T.	0.5	0.08
	9	1 heaping T.	1.5	0.14
baking powder	75	1 lg.	0.2	0.15
nes	75	⅔ c.	4.1	3.08
	75	⅔ c.	7.3	5.47
d	120	⅔ c.	2.5	3.00
es	100	⅔ c.	1.2	1.20
d	120	½ c.	1.0	1.20
es	30	⅔ c.	5.1	1.53
kes, Post's 40%	30	⅔ c.	3.9	1.17
epared	3	1 T.	8.5	0.25
reds, Post's	3	1 T.	8.3	0.25
heat, crude	3	1 T.	11.3	0.34
uts	30	4 av.	3.9	1.17
	30	4 av.	14.7	4.41
pumpernickel	30	1 sl.	1.3	0.39
	25	1 sl.	0.5	0.12
whole	30	1 sl.	1.2	0.36
e	25	1 sl.	0.5	0.12
e‡	25	1 sl.	0.8 (8)	0.20
le wheat	30	1 sl.	1.2	0.36
le wheat‡	30	1 sl.	2.8 (16)	0.84
ast Crisp, Cellu	3	1 T.	22.6	0.68
ast Wheat, Heinz	20	2 T.	5.6	1.12
li	100	1 med. stalk	1.3	1.30
ed, *mws*	100	1 med. stalk	4.2	4.20
ls sprouts	100	1 c.	1.3	1.30
ed, *mws*	100	1 c.	4.8	4.80
	..		0.0	
ge‡	85	1 c.	1.0 (10)	0.85
ed, *mws*	100	½ c.	2.2	2.20
ese	110	1 c.	0.6	0.66
, *mws*	85	1 c.	3.4	2.89
various types	60	1	0.1	0.06
t (dark)	60	1	1.2	0.72
d peel (lemon, orange, efruit)	10	1 sm. piece	2.3	0.23
oupe	100	¼, 5" diam.	0.3	0.30
	100	¼, 5" diam.	1.0	1.00
een moss, dried	10	1 T.	71.3	7.13
s‡	75	½ c.*	1.1 (10)	0.83
ed, *mws*	75	½ c.	3.0	2.25
pped, Heinz	30	1 oz.	0.7	0.21
ined, canned	15	1 T.	0.6	0.09
v nuts, cooked, salted	15	10	1.3	0.20
), tomato	20	1 T.	0.4	0.08
ower	75	½ c.*	0.9	0.68
ed, *mws*	75	½ c.	2.4	1.80
ac	100	1 med.	1.4	1.40
ed, *mws*	100		4.9	4.90
	40	2, 7" stalks	0.7	0.28
	40	2, 7" stalks	1.8	0.72
ed, *mws*	50	½ c.	2.2	1.10
ined, canned	20	4 t.	0.8	0.16

Food items.	Size of portion. Grams.	Size of portion. Household measures.	Fiber Per cent.	Fiber [illegible]
Cemac, Mead	15	1 T.	0.3	[illegible]
Cereal, Strained, Beech-Nut	25	5 t.	0.2	[illegible]
Wheatheart, Clapp	15	1 T.	0.2	[illegible]
Cerevim	30	½ c.	2.5	[illegible]
Chard, leaves only	100	1½ c.	0.8	[illegible]
Cheese	..		0.0	
Cherries	75	½ c.	0.3	[illegible]
mws	75	½ c.	1.7	1.[illegible]
Black, canned	85	15	0.1	[illegible]
Maraschino, bottled	5	1	0.3	[illegible]
Royal Anne, canned	85	15	0.2	[illegible]
Chestnuts	25	4	1.5	[illegible]
mws	25	4	9.3	2.[illegible]
Chickory, leaves	20	½ c.	0.8	[illegible]
Chili sauce	20	1 T.	0.7	[illegible]
Chives	55	½ c.	2.0	1.[illegible]
Chocolate, sweetened	30	1 oz.	2.0	0.[illegible]
Unsweetened	30	1 oz.	2.5	0.7[illegible]
Citron, candied	10	1 sm. piece	1.4	0.14
Cocoa powder	5	2 t.	4.0	0.20
Cocoanut	10	1″ sq.	3.4	0.[illegible]
mws	10	1″ sq.	7.6	0.7[illegible]
Desiccated	4	1 T.	4.1	0.1[illegible]
Moist, canned	5	1 T.	4.2	0.2[illegible]
Cocoanut milk, *mws*	..		0.0	
Collards	50	½ c.	1.0	0.5[illegible]
Cookies:				
Fig bars	30	2	1.7	0.51
Gingersnaps	20	3	0.4	0.08
Home-made type	20	1	0.2	0.04
Macaroons	40	1 lg.	1.1	0.44
Molasses	20	1	0.4	0.08
Oatmeal	20	1	0.3	0.06
Peanut	20	1, 3″ diam.	0.8	0.16
Sandwich-type	25	2	0.3	0.07
Shortbread	25	3	0.1	0.02
Wafers	15	4	0.2	0.03
Corn, sweet	75	½ c.*	0.8	0.60
Cream style, canned	115	½ c.	0.3	0.35
Whole kernel, canned	100	½ c.	0.6	0.60
Corn Flakes, Kellogg's	30	1⅓ c.	0.4	0.12
Corn Flakes‡	30	1⅓ c.	1.4 (15)	0.42
Corn beef hash, canned	230	½ lb.	0.5	1.15
Cornmeal	20	½ c.*	0.4	0.08
Yellow, old-type	100	⅔ c.	1.8	1.80
Cornsalad	25	½ c.	0.8	0.20
Cracked wheat	30	¼ c.	2.7	0.81
Crackers, Graham	25	3, 3″ sq.	1.5	0.38
Graham‡	25	3, 3″ sq.	2.2 (40)	0.55
Soda	10	2, 2″ sq.	0.3	0.03
Cranberries	50	½ c.	1.4	0.70
mws	50	½ c.	4.2	2.10
Cranberry sauce, canned	100	⅓ c.	0.4	0.40
Cream of Wheat, "5-minute"	20	⅓ c.*	0.5	0.10
Cress, garden	20	½ c.	1.2	0.24
Cucumbers	75	2″ x 2½″	0.5	0.38
mws	75	2″ x 2½″	0.4	0.30
Currants, all, av.	50	⅓ c.	3.2	1.[illegible]
Black, *mws*	25	¼ c.	8.7	2.17
Red, *mws*	25	¼ c.	8.2	2.[illegible]
White, *mws*	25	¼ c.	6.8	1.7[illegible]
Dried, *mws*	50	⅓ c.	6.5	3.[illegible]
Damson plums, *mws*	50	4 med.	4.1	2.[illegible]

	Size of portion.		Fiber.	
ood items.	*Grams.*	*Household measures.*	*Per cent.*	*Grams per portion.*
n greens	50	½ c.	1.8	0.90
. . . .	100	1 tuber	0.7	0.70
ied	15	3 sm.	2.2	0.33
. . . .	15	3 sm.	8.7	1.30
Sorrel	25	½ c.	0.8	0.20
its	45	1, 3″ diam.	0.2	0.09
t	75	½ c.*	0.9	0.68
. . . .	75	½ c.	2.5	1.87
. . . .	. .		0.0	
. . . .	8	1 T.	2.0	0.16
chicory, leaves . .	15	¼ sm. head	0.8	0.12
. . . .	15	¼ sm. head	2.2	0.33
. . . .	20	½ c.*	0.2	0.04
ed, Beech-Nut . .	25	5 t.	0.1	0.03
. . . .	50	⅓, 3″ diam.	0.8	0.40
esh	75	3	1.7	1.28
d	45	3	5.8	2.61
d, *mws*	45	3	18.5	8.32
ota, canned . . .	85	3	0.8	0.68
s (hazelnuts) . . .	35	30	3.0	1.05
. . . .	35	30	10.3	3.60
. . . .	. .		0.0	
buckwheat . . .	115	1 c.	0.4	0.46
. . . .	100	1 c.	0.4	0.40
bean	100	1¼ c. sc.	3.7	3.70
ite	100	¾ c.	0.7	0.70
whole wheat flakes .	30	1 c.	1.2	0.36
h dressing, com. . .	11	2 t.	0.3	0.03
salad, canned . . .	140	1 c.	0.4	0.56
s	140	1 c.	1.1	1.54
in	. .		0.0	
r, crystallized . . .	10	1 sm. piece	0.7	0.07
rbread	60	1 sq.	0.1	0.06
eberries	100	⅔ c.	2.5	2.50
pe, *mws*	100	⅔ c.	3.5	3.50
nned	120	½ c.	1.5	1.80
efruit	100	½, 4″ diam	0.3	0.30
nned	135	¾ c.	0.2	0.27
e-Nuts	30	¼ c.	2.4	0.72
es, American types (slip skin)	100	24	0.5	0.50
uropean types (adherent skin)	100	15 lg.	0.5	0.50
hompson seedless, canned	120	½ c.	0.2	0.24
engage plums, *mws* . .	50	3 med	2.6	1.30
avas, common . . .	15	1 sm.	5.5	0.83
zelnuts (filberts) . . .	35	30	3.0	1.05
ws	35	30	10.3	3.60
kory nuts	35	¼ c.	2.0	0.70
niny grits	20	½ c.*	0.7	0.14
ooked or canned . .	100	½ c.	0.1	0.10
ney	. .		0.0	
neydew melon . . .	240	¾ c. diced	0.5	1.20
rseradish, prepared . .	10	1 t.	1.0	0.10
rseradish roots . . .	5	½ t.	2.4	0.12
mws	5	½ t.	8.3	0.41
ckleberries	100	⅔ c.	1.2	1.20
ms and preserves, com. .	25	1 T.	0.6	0.15
Home-cooked	25	1 T.	1.2	0.30
llies	. .		0.0	
le, leaves	75	½ c.*	1.2	0.90
hlrabi	75	½ c.*	1.1	0.76
umbles	30	½ c.	1.9	0.57
mquats	50	3 med.	3.7	1.85
mb stew, canned . . .	115	¼ lb.	0.4	0.46

Food items.	Size of portion. Grams.	Size of portion. Household measures.	Fiber. Per cent.	Fiber. Grams per portion.
Lambsquarters	75	1½ c.	2.6	1.95
Leeks, bulbs and leaves	55	½ c.	1.3	0.72
Boiled, *mws*	75	½ c.	3.9	2.92
Lemons, whole, *mws*	..		5.2	
Lemon juice, *mws*	..		0.0	
Lentils	60	¼ c.	3.0	1.80
Boiled, *mws*	250	1 c.	2.4	6.00
Lettuce‡	50	1 lg. leaf	0.6 (12)	0.30
mws	50	1 lg. leaf	1.4	0.70
Litchi "nuts"	25	10	3.2	0.80
Loganberries	75	¾ c.	1.4	1.05
mws	75	¾ c.	6.2	4.65
Canned	120	¾ c.	2.0	2.40
Loquats	25	1 med.	0.5	0.12
Macadamia nuts	30	14	2.5	0.75
Macaroni	25	½ c.*	0.4	0.10
Boiled	240	1 c.	0.1	0.24
Macaroons	40	1 lg.	1.1	0.44
Malt Breakfast Food	30	¼ c.	1.5	0.45
Malted milk	8	1 T.	0.3	0.02
Mangoes	160	1 sm.	1.0	1.60
Meat	..		0.0	
Melba toast	20	2, 4″ sq.	0.4	0.08
Mellin's Food	15	2 T.	0.2	0.03
Melotose	9	1 T.	1.0	0.09
Milk	..		0.0	
Molasses	..		0.0	
Mushrooms	50	½ c.*	0.9	0.45
mws	50	½ c.*	2.5	1.25
Buttons, canned	50	¼ c.	0.7	0.35
Slices, canned	50	¼ c.	0.7	0.35
Stems and pieces	50	¼ c.	2.9	1.45
Muskmelons, av.	100	¼, 5″ diam.	0.7	0.70
Mustard and cress, *mws*	20	½ c.	3.7	0.74
Mustard greens	75	½ c.*	0.8	0.60
Nectarines	100	1 med.	0.4	0.40
mws	100	1 med.	2.4	2.40
Nestlé's Food	8	1 T.	0.9	0.07
Noodles	25	½ c.*	0.4	0.10
Oatmeal, strained, Beech-Nut	25	5 t.	0.2	0.05
Oats, rolled	20	½ c.*	0.9	0.18
Oils	..		0.0	
Okra	50	7, 2½″ pods	1.0	0.50
Olives, green, brined	14	3	1.2	0.17
Ripe, brined, med.	14	3	1.8	0.25
Mammoth	15	2	2.6	0.39
Onions	75	½ c.*	0.8	0.60
mws	75	½ c.	1.3	0.97
Young, green	25	5 sm.	1.8	0.45
Young, green, *mws*	25	5 sm.	3.1	0.77
Oranges	100	1 sm.	0.6	0.60
mws	100	1 sm.	2.0	2.00
Canned	135	¾ c.	0.5	0.67
Orange juice, *mws*	..		0.0	
Pablum	5	2 T.	0.9	0.05
Papaya	120	1/10 av.	0.9	1.08
Parsley	1	1 t.	1.8	0.02
Parsnips	75	½ c.*	2.2	1.65
mws	75	½ c.*	4.0	3.00
Boiled, *mws*	75	½ c.*	2.5	1.87
Passion fruit, *mws*	100		15.9	15.90
Peaches	100	1 sm.	0.6	0.60
mws	100	1 sm.	1.4	1.40
Yellow cling, canned	140	2 halves	0.3	0.42

ood items.	Size of portion. Grams.	Household measures.	Fiber. Per cent.	Grams per portion.
d, canned	15	1 T.	0.5	0.07
	50	3 med.	3.5	1.75
mws	50	3 med.	14.3	7.15
	60	30	2.4	1.44
	60	30	9.4	5.64
utter	15	1 T.	2.2	0.33
utter‡	15	1 T.	1.3 (12)	0.20
	150	1, 3" long	1.4	2.10
	150	1, 3" long	2.5	3.75
tt, canned	100	2 halves	0.6	0.60
	75	4 halves	6.1	4.58
een	75	½ c.*	2.2	1.65
, *mws*	75	½ c.	5.2	3.90
, boiled, *mws*	75	½ c.	5.2	3.90
g, canned	70	½ c.	1.0	0.70
ed, *mws*	70	½ c.	4.4	3.08
ned, canned	25	5 t.	0.7	0.17
, boiled, *mws*	70	½ c.	4.8	3.36
, split	50	¼ c.	1.2	0.60
d carrots, canned	75	½ c.	1.2	0.90
	25	6	2.2	0.55
s, green	25	3" piece	1.4	0.35
	25	3" piece	1.6	0.40
mons	50	1 sm.	1.5	0.75
hn's	20	2 T.	2.2	0.44
s, cucumber	20	1 T. (chopped)	0.4	0.08
tos, canned	11	1 t.	0.6	0.06
pple	75	½ c. diced	0.4	0.30
	75	½ c. diced	1.2	9.00
died	50	1 slice	0.8	0.40
shed, canned	75	½ c.	0.4	0.30
ed, canned	75	1 sl.	0.3	0.23
bits, canned	75	½ c.	0.2	0.15
pple rice pudding,				
nz	60	2 oz.	0.3	0.18
uts (pignolias)	10	1 T.	1.0	0.10
hios	20	¼ c.	2.5	0.50
s	50	2, 2½" long	0.5	0.25
s	100	4	2.1	2.10
rn, popped	15	1 c.	1.7	0.25
oes, sweet	100	1 med.	1.0	1.00
eet, boiled, *mws*	100	1 med.	2.3	2.30
ite	100	1 med.	0.4	0.40
ite‡	100	1 med.	0.5 (11)	0.50
ite, new, boiled, *mws*	100	3 med.	2.0	2.00
ite, old, boiled, *mws*	100	1 med.	1.0	1.00
ry	..		0.0	
els	25	6 med.	0.3	0.08
pudding, Heinz	60	2 oz.	1.2	0.07
s, fresh	100	4 med.	0.5	0.50
ned	100	3 med.	0.3	0.30
ained, canned	15	1 T.	0.7	0.10
ed	50	4 lg.	1.6	0.80
ed, *mws*	50	4 lg.	16.1	8.05
l Rice	15	1 c.	0.5	0.08
l Wheat	15	1 c.	1.6	0.24
kin	100	½ c.	1.3	1.30
s	100	½ c.	0.5	0.50
ned	125	½ c.	1.2	1.50
hes	50	6 med.	0.7	0.35
s	50	6 med.	1.0	0.50
s	60	½ c.	1.7	1.02
s	60	½ c.	6.8	4.08

Food items.	*Size of portion.*		*Fiber.*	
	Grams.	*Household measures.*	*Per cent.*	*Grams per portion.*
Raspberries, black	75	⅔ c.	3 5	2 62
Red	75	⅔ c.	2 8	[illegible]
Canned, water pack	100	½ c.	2 5	[illegible]
Canned, heavy syrup	140	⅔ c.	1 9	[illegible]
Rhubarb	100	⅔ c.	0 7	[illegible]
mws	100	⅔ c.	2 6	[illegible]
Rice, natural brown	20	1 heaping T.	0 9	[illegible]
White	20	1 heaping T.	0 3	[illegible]
White, boiled	100	½ c.	0 1	[illegible]
Wild Indian	20	⅙ c.	1 4	[illegible]
Rice bran	3	1 T.	10 7	0 32
Rice Flakes	30	1 c.	0 7	0 21
Rusk, white flour	15	1	0 2	0 03
Whole wheat	15	1	1 9	0 29
Rutabagas	50	½ c.*	1 3	0 65
Ry-Krisp	6	1	1 3	0 08
Salsify	100	2, 6″ long	1 8	1 80
Sauerkraut	80	½ c.	1 0	0 80
Savoy cabbage, boiled, *mws*	100	½ c.	2 5	2 50
Seakale	100	1½ c.	0 8	0 80
Shredded Wheat	30	1 biscuit	2.6	0 78
Shredded Wheat‡	30	1 biscuit	5 9 (13)	1 77
Sobee, Mead	5	1 T.	1 4	0 07
Sorrel or dock	25	½ c.	0 8	0 20
Soups:				
Clear	..		0 0	
Cream of vegetable	250	1 c.	0 1	0 25
Soybean curd or cheese	100		0.1	0 10
Spaghetti	25	½ c.*	0.4	0 10
Spanish melon	240	¾ c. diced	0 5	1 20
mws	240	¾ c. diced	0 9	2 16
Spinach	75	½ c.*	0 7	0 53
Spinach‡	75	½ c.	0 5 (23)	0 38
Boiled, *mws*	75	½ c.	6 3	4 72
Chopped, Heinz	30	1 oz.	0.7	0 21
Strained, canned	25	5 t.	0 7	0 18
Spring greens, boiled, *mws*	75	½ c.	3.8	2 85
Squash, summer	100	⅛, 5″	0 5	0 50
Winter	100	2 x 2 x 1″	1.4	1 40
Starches	8	1 T.	0 1	0 01
Strawberries	100	¾ c.	1 2	1 20
mws	100	¾ c.	2 2	2 20
Swedes, boiled, *mws*	50	½ c.*	2 8	1 40
Syrups	..		0 0	
Tangerines	100	2, 2″ diam.	1 0	1 00
mws	100	2, 2″ diam.	1 9	1 90
Tapioca	40	¼ c.	0.1	0 04
Thousand Island Dressing, com.	20	1 T.	0 6	0.12
Tomato juice‡	120	½ c.	0 1 (7)	0 12
Tomato paste, canned	30	1 oz.	0 9	0.27
Tomatoes	100	1 sm.	0 6	0 60
mws	100	1 sm.	1 5	1.50
Strained, canned	25	5 t.	0 4	0.10
Turnips	50	½ c.*	1 1	0 55
mws	50	½ c.*	2 8	1.40
Boiled, *mws*	50	½ c.*	2 2	1 10
Turnip tops	100	1 c.	1 2	1.20
Boiled, *mws*	100	1 c.	3 9	3.90
Vegetable marrow, boiled, *mws*	100	⅔ c.	0 6	0 60
Vegetable mixture, canned	80	½ c.	0 7	0 56
Vegetable soup	250	1 c.	0 5	1 25

	Size of portion.		Fiber.	
...od items.	Grams.	Household measures.	Per cent.	Grams per portion.
...s, green, creamed.				
...	80	½ c.	0.9	0.72
...chopped, Heinz	80	½ c.	0.5	0.40
...	8	1 T.	0.7	0.06
... black	35	6	1.9	0.66
...	35	6	2.1	0.73
..., *mws*	35	6	22.6	7.91
...ss	20	½ c.	0.5	0.10
...	20	½ c.	3.3	0.66
...lon	240	1 c. diced	0.6	1.44
...*akes*	30	¾ c.	1.8	0.54
...erm	9	1 heaping T.	2.5	0.23
...whole	75	½ c.	1.8	1.35
...	20	½ c.*	0.6	0.12
...	35	1 c.	1.8	0.63
...	125	1 med	0.8	1.00
...	100	1 tuber	0.6	0.60
...	7	1 piece	0.3	0.02
...brewer's	11	2 t.	0.8	0.09
...pressed	15	1 square	0.3	0.05

Purins.

...ds which contain nucleic acid (and hence the purin ring) are ...nated as purin foods. The end-product of purin metabolism ...c acid. All animal foods except milk, cheese, and fresh eggs ...in purins. Glandular organs and meat extracts show the high- ...concentration. In Table 58 A no uric acid equivalent for ... N is shown for items containing methylated purins since it is ...tionable whether such are converted under physiologic condi- ... into uric acid. The theobromine of cocoa and chocolate does ...form uric acid.

...rin analyses are shown in two separate tables, 58 A presenting ... data which do not necessarily agree with the newer figures of ...e 58 B from McCance and Widdowson ("Chemical Composition ...oods," Medical Research Council, 1940).

...e only analyses of these investigators which appear in Table ... are those for coffee and tea which are designated (*mw*). Fish ...as been reported as containing no purin nitrogen but McCance ...Widdowson found high concentrations.

TABLE 58 A.—Purin Content of Various Foods

Food items	Purin N mg. per 100	[illegible]
Anchovies	145.0	[illegible]
Apricots	None	
Apples	None	
Arrowroot	None	
Asparagus, cooked	8.6	[illegible]
Bananas	None	
Barley	None	
Beans	25.0	[illegible]
Beef, muscle	60.0	[illegible]
Pancreas	183.0	[illegible]
Ribs	45.5	[illegible]
Sirloin	52.2	[illegible]
Steak	82.6	[illegible]
Beer, Lager	5.0	[illegible]
Pale ale	5.9	[illegible]
Porter	6.0	[illegible]
Blueberries	None	
Bouillon	10.0	[illegible]
Bread, white	None	
Butter	None	
Cabbage	None	
Calves' liver	120.0	[illegible]
Calves' spleen	160.0	[illegible]
Calves' thymus	440.0	[illegible]
Carp	60.0	[illegible]
Carrots	None	
Cauliflower	None	
Caviar	None	
Celery	5.0	[illegible]
Cheese	None	
Chicken	51.8	[illegible]
Cod	23.3	[illegible]
Coffee	29.4	
Coffee, ground, roasted (*mw*)	38.0	
Coffee, infusion (*mw*)	Trace	
Corn	None	
Crab	20.0	[illegible]
Cucumbers	None	
Eel, smoked	27.0	[illegible]
Eggs, fresh	None	
Farina	None	
Filberts	None	
Flour, white	None	
Fruits	None	
Gelatin	None	
Goose	33.0	[illegible]
Grapes	None	

	Purin N, mg. per cent.	Calculated as uric acid, mg. per cent
	40.8	122.4
	46.2	138.6
	25.0	75.0
	69.0	207.0
	25.0	75.0
	15.0	45.0
...ed	None	
	110.0	330.0
	120.0	360.0
	38.0	114.0
	22.0	66.0
	None	
	18.0	54.0
	38.6	115.8
...stralian	None	
	None	
	3.1	9.3
	None	
	29.0	87.0
	183.0	549.0
...beef	123.0	369.0
...pig's	18.0	54.0
	15.6	46.8
	None	
	None	
	34.0	102.0
	None	
	45.0	135.0
	31.8	95.4
	None	
	48.5	145.5
...n	22.7	68.1
...k	0.8	2.4
	38.0	114.0
	5.0	15.0
	None	
...aked	None	
	46.6	139.8
	116.7	350.0
...s in oil	27.0	81.0
...ans	26.5	80.0
	58.0	174.0
	2.0	6.0
...ears	230.0	690.0
...eads*	None	
...s	16.4	
...lon	10.7	
...hina		

...d glands are frequently sold as sweetbreads.

Food items.	Purin N, mg. per cent.	Calculated as uric acid mg. per cent.
Tea, Indian	14.7	
Tea, Indian (*mw*)	72.0	
Tea, infusion (*mw*)	Trace	
Thymus, beef	402.5	1207 [illegible]
Thymus, calves'	440.0	1320 [illegible]
Tomatoes	None	
Tongue, smoked	55.0	165 [illegible]
Tripe	22.9	68 [illegible]
Trout	56.0	168 [illegible]
Turkey	50.4	151 [illegible]
Veal broth	423.3	1270 [illegible]
Veal, loin	46.5	139 [illegible]
Veal, muscle	60.0	180 [illegible]
Venison	39.0	117 [illegible]
Walnuts	None	
Wines (Claret, Volnay, Sherry, Port)	None	

Table 58 B.—**Purin Content of Cooked Meat and Fish Products.**

Food items.	Purin N, mg. per cent.	Calculated as uric acid mg. per cent.
Bacon, fried	66–86	198–258
Bass, steamed	73	219
Beef, corned, canned	36	108
Beef, sirloin, roasted, lean	60	180
Lean and fat	46	138
Beef, silverside, boiled	55	165
Beef, steak, fried	61	183
Grilled	85	255
Beef, topside, boiled, lean only	72	216
Beef, topside, roasted, lean only	73	219
Lean and fat	66	198
Beef, stewed, lean only	61	183
Beef stew	32	96
Bloaters, grilled	133	399
Bovril	324	972
Brains, calves', boiled	40	120
Brains, sheep, boiled	31	93
Catfish, steamed	60	180
Fried	65	195
Chicken, boiled	61	183
Chicken, roasted	72	216
Cod, steamed	62	186
Cod steaks, fried	63	189
Grilled	82	246
Cod roe, baked in vinegar	130	390
Cod roe, fried	112	336
Crab, boiled	61	183

Food items	Purin N, mg. per cent.	Calculated as uric acid, mg. per cent.
	18	54
eat	64	192
sted	23	69
d	36	108
s	86	258
, steamed	61	183
	100	300
asted	98	294
oasted	142	426
owl, roasted	72	216
, fresh, steamed	83	249
	65	195
, smoked, steamed	68	204
, steamed	52	156
ried	42	126
teamed	64	192
oiled, lean only	45	135
and fat	99	297
oasted	60	180
ed	174	522
sheep, roasted	160	480
g, baked in vinegar	172	516
g, fried	484	1452
g roe (soft), fried	11	33
tew	147	441
y, ox, stewed	137	411
y, sheep, fried	91	273
rs, baked	0	0
	60	180
steamed	56	168
ed	143	429
, Calves', fried	143	429
, ox, fried	73	219
ter, boiled	100	300
kerel, fried	73	219
et, gray, steamed	81	243
et, red, steamed	154	462
els, boiled	63	189
ton chop, fried, lean only	40	120
ton chop, fried, lean and fat	61	183
ton chop, grilled, lean only	46	138
ton chop, grilled, lean and fat	91	273
ton, leg, boiled	77	231
ton, leg, roasted	56	168
tton, scrag and neck, stewed	236	708
cubes	44	132
sters	145	435
rridge, roasted		

Food items.	*Purin N mg. per cent.*	[illegible]
Pigeon, boiled	83	249
Pigeon, roasted	96	288
Pheasant, roasted	95	285
Plaice, steamed	53	159
Fried	47	141
Pollack, steamed	71	213
Fried	75	225
Pork, leg, roasted	66	198
Pork loin, roasted lean only	64	192
Lean and fat	51	153
Pork loin, smoked, cooked, lean only	50	150
Pork, loin chops, grilled, lean only	68	204
Lean and fat	49	147
Prawns, cooked	70	210
Rabbit, stewed	61	183
Salmon, canned	101	303
Salmon, steamed	78	234
Sardines, canned	234	702
Sausage, black	2	6
Scallops, steamed	117	351
Shepherd's pie	15	45
Shrimps, cooked	72	216
Skate, fried	41	123
Smelts, fried	168	504
Sole, steamed	53	159
Fried	52	156
Sprats, fried	125	375
Sprats, smoked, grilled	250	750
Steak and kidney pie	49	147
Sturgeon, steamed	50	150
Sweetbreads, stewed	426	1278
Tongue, ox, pickled	48	144
Tongue, sheep, stewed	52	156
Tripe, stewed	22	66
Trout, steamed	92	276
Trout, sea, steamed	95	285
Turbot, steamed	64	192
Turkey, roasted	79	237
Veal cutlet, fried	106	318
Veal fillet, roasted	89	267
Vegex (marmite)	356	1068
Venison, roasted	97	291
Whelks, cooked	65	195
Whiting, steamed	90	270
Fried	94	282
Winkles, boiled	70	210

TABLE 59.—**Cholesterol Content of Foods.**†

...ns.	mg. per 100 grams (moist wt.)
..., lean .	95
	125
...f	2200
	280
...n .	160
...ssed . .	155
...ger, processed	135
...ey Jack .	190
... cream .	140
	145
	160
	145
...s, whole fresh	468
	2140

Food items.	mg. per 100 grams (moist wt.)
Egg-yolk, hen's, fresh	2000
dried . . .	3900
Heart, beef . .	150
poultry . . .	160
Kidney, beef . .	400
Liver, beef . .	190–320
calf	360
lamb . . .	610
pork	420
Lungs, beef . .	350–390
Oysters* . . .	230–470
Pork spareribs .	105
Sweetbreads . .	220–280
Tripe	150
Veal, breast . .	100
shank . . .	140
Yeast, brewer's, dried*	680

... foods contain sterols other than cholesterol; figure represents total digito-...tate.

... from Okey, R.: Jour. Am. Dietet. Assn. **21**, 341, 1945.

WATER.

The total water supply on an average diet exceeds the [illegible] intake by about 700 grams. The water eliminated by the [illegible] exceeds the urine volume by approximately the same amo[illegible] The water of combustion for carbohydrates is 55 to 60 grams [illegible] every 100 grams oxidized, 40 to 45 grams for protein, and ab[illegible] 110 grams for fat. For further pertinent facts in the water eco[illegible] of the body, consult pages 124–125. The following table indica[illegible] the quantities of water present in comond foods as ingested.

Table 60.—**Water Content of Various Foods as Eaten.***

Food items.	*Per cent.*
Almonds	5
Apples	79–91
Apricots	82–92
Artichokes, French, cooked	85
Artichokes, Jerusalem, cooked	80
Asparagus, cooked	92–95
Avocados	55–84
Bananas (av. 75 per cent)	65–83
Beans:	
Baked	68–70
Kidney, cooked	72–73
Lima, canned	80
String, cooked	93–95
Beef, cooked	52–60
Beets, cooked	80–85
Brazil nuts	8
Bread, including rolls	25–36
Bread, freshly baked‡	31–38
Bread, air-dried	10–15
Bread, toasted	5–10
Broccoli, cooked	90–93
Brussels sprouts	90–95
Butter	15–16
Cabbage, boiled	92–95
Cabbage, raw	88–94
Cabbage, Chinese	94–97
Cake	16–30
Candy	4– 6
Carrots, raw	83–91
Carrots, cooked	81–92
Cauliflower, cooked	94–95
Celeriac	84–91
Celery	90–95
cooked	96
Cereals, prepared	8–10
Cheese:	
American	28–38
Camembert	43–54

Food items.	*Per c*[illegible]
Cheese:	
Compounded	[illegible]
Cottage	[illegible]
Cream	38–[illegible]
Cream, Phila.	[illegible]
Parmesan	15–[illegible]
Potted cottage	[illegible]
Process	[illegible]
Roquefort	37–[illegible]
Soft rennet	50–[illegible]
Swiss	25–[illegible]
Cherries	75–[illegible]
Chestnuts, fresh	[illegible]
Chicken, cooked	55–[illegible]
Chicory	91–[illegible]
Chocolate	[illegible]
Cocoanut, canned moist	[illegible]
Cocoanut, desiccated	[illegible]
Cocoanut, fresh	[illegible]
Cookies	3–[illegible]
Corn,† young	76–[illegible]
Corn,† medium	69–[illegible]
Corn,† old	60–[illegible]
Corn, canned	[illegible]
Cornsalad	92–[illegible]
Crackers, biscuits	3–[illegible]
Cream	54–[illegible]
Cress, garden	81–[illegible]
Cucumbers	95–[illegible]
Currants, fresh	77–[illegible]
Damsons	77–[illegible]
Dandelion greens	81–[illegible]
Dates	15–[illegible]
Dock or sorrel	92–[illegible]
Egg-white	[illegible]
Egg-yolk	[illegible]
Eggs, whole	73–[illegible]
Endive	91–[illegible]
Fennel	[illegible]

* "Cooked" implies boiled.

† Raw, for comparative purposes only.

‡ 38% is stand[illegible]

...items	Per cent.
	40
...sh	50–88
...ed	52–70
..., English	55–70
	83–90
...s	75–85
	86–89
	15–30
	75–87
	92–94
...d	77–87
...al	65–85
...tters	37–50
...ves:	
	87
	91–96
	80
...pple	85
...uit	86–91
	75–87
...cooked	90
...oked	45–50
	17–18
...dish	73–74
...m	55–62
	70–75
	15–20
...cooked	45–67
	85–92
..., cooked	72
...e	91–97
... dried	18
...densed	27–30
...porated	74
...le	85–88
...n and buttermilk	90–91
...ses	20–25
...ooms, fried	60–65
...rd greens	87–96
...n, cooked	45–67
...ines	83
... green	58
..., ripe	65
...s, raw	80–90
...s, cooked	91–92
...s, fried	40–45
...es	83–90
...y	79–88

...age 78 per cent.

Food items	Per cent
Parsnips, cooked	83–90
Peaches	82–90
Peanut butter	2
Peanuts	5– 9
Pears	76–86
Peas, green, cooked	75–85
Peas,† young	80–84
Peas,† medium	70–79
Peas,† old	57–69
Peppers, green	91–94
Pineapple, fresh	81–90
Plums	74–91
Potatoes, sweet, baked	52–55
Potatoes, sweet, boiled	72
Potatoes, white:	
Baked	45
Boiled	75–80
Chips	2– 6
French fried	47
Mashed	73
Roast	64
Prunes	20–25
Radishes	87–96
Raisins	18–22
Rhubarb	94
Salad greens	93–96
Sauerkraut	88–89
Shellfish	70–85
Soups	80–95
Spinach, cooked	85
Stew, meat	83–88
Succotash, cooked	76
Swiss chard	90–95
Syrup, corn	25
Syrup, maple	25–30
Squash, boiled	93–94
Tangerines	88–91
Tomato juice	94
Tomatoes	93–95
Tomatoes, fried	85–87
Turnip tops, cooked	92–93
Turnips, cooked	94–95
Turnips, raw	86–96
Vegetable marrow, cooked	95–99
Vegetables	85–98
Walnuts	20–25
Watercress	91–97
Watermelon	91–93

† Raw, for comparative purposes only.

The data shown in Tables 61, 62 and 63 represent acidity meas-
ments with the glass electrode (Bridges and Mattice, 1939). A fe
other values are to be found in the literature. Shrimp paste
placed at pH 6.28 to 6.43 by Monier-Williams (1924). Flour
reported to be pH 5.7, bread 5.3, cake 6.7, and macaroni 5.9 (Cla
1935). Clague and Fellers (1936) used the quinhydrone electro
for the study of cider made from different varieties of apples; th
values ranged from pH 3.1 to 4, including data with reference
clarification processes. Kidd and Hanes (1936) reported incre
in the pH (2.8 to 3.7) during storage of apples, the rise being rela
to warmth of storage atmosphere. The pH of lettuce kraut
placed at 5.1 to 5.25 by Cruess and Gilliland (1939). Valaer (19
1940) found Scotch whisky to vary from pH 4 to 4.78; domestic a
foreign brandies generally fall within the range pH 3 to 5, th
acidity in part being attributable to slow production of sulfuric ac

Haas (1938) examined different sections of the avocado for vari
tions in pH. The inner and outer portions of the soft edible pul
(without skin) of the stem halves of mature fruit were pH 6.82 an
6.72 respectively, whereas the corresponding portions of the ti
halves had values of 6.64 and 6.44.

According to Smith (1935) fresh egg-white has a pH of 7.97 bu
changes to 9.2 to 9.5 on loss of CO_2 during storage. It is believe
that the quality is best preserved by holding the pH at 7.5 to 8 b
means of carbon dioxide. Ulrik and Davidsen (1933) record th
pH of the new-laid egg at approximately 8.2 with a rapid rise t
9.4 during the first twelve hours succeeded by gradual increase t
9.8 by the ninth day. They found no distinct change thereaft
until the fifty-third day. Our findings are presented in Table 6

TABLE 61.—**Variation in pH of Eggs With Age.**

Age.	Whole.	White.	Yolk.
3 hours	6.58	7.96	6.10
	7.00	8.20	6.88
12 hours (or less)	6.70	7.90	6.00
24 hours	6.62	8.30	6.10
	6.60	8.35	6.10
48 hours	7.43	8.89	6.17
	7.87	8.85	6.29
"New-laid" store eggs	7.72	9.18	6.64
	7.72		
Cold-storage eggs*	7.50	8.87	7.00
	7.60	8.99	6.90
	7.69	8.80	6.38
	7.58	8.90	6.72
	7.32	9.00	6.82
	8.20	8.63	7.80
	7.90	9.00	7.20
	7.62	9.00	

* Except for this group (where each analysis is on a different egg) data carr
across the table represent tests on the same egg, the white and yolk being mixed af
separate determinations.

r American Roquefort cheese was found to fall within the d 4.7 to 6.5 by Coulter and co-workers (1938).
r is reported by Parsons (1940) as varying from pH 6.6 to values noted by Pont and Sutton (1938) varied from 7 to retchmar (1938) observed marked correlation between the lavor score and the pH findings, the butters with higher core generally being less acid than those with lower scores. timum acidity for the keeping quality of butter was stated H 6.7 to 6.9, it being regarded as undesirable to store butter H was less than 6.3 or more than 7.1.

TABLE 62.—**pH of Representative Foods.***

Item.	pH
. . . .	6.00, 5.59, 5.62, 5.63, 5.70, 5.19
es, stuffed with capers, in olive oil .	5.58
ennel)	5.48, 5.62, 6.72, 5.78, 5.80, 5.87
eating	3.33, 3.38, 3.58, 3.35, 3.84, 3.84
baked with sugar	3.20, 3.22, 3.28, 3.55, 3.54, 3.50
ice, canned	3.62, 3.52, 3.38, 3.40, 3.35, 3.42
auce, canned	3.40, 3.23, 3.15, 3.10, 3.09, 3.12
auce, chopped, Clapp	3.24, 3.24, 3.24, 3.24, 3.35, 3.35
auce, strained, Clapp	3.24, 3.24, 3.24, 3.24, 3.42, 3.42
urrant jelly, com.	3.00
s	4.50, 4.22, 4.67, 4.33, 4.52, 4.18
s, canned	3.46, 3.42, 3.42, 3.45, 3.42, 3.47
s, unsweetened, canned	3.78
ts, puréed, Stokely	3.80, 3.83, 3.70, 3.68, 3.62, 3.42
ts, strained, Clapp	3.81, 3.78, 3.81, 3.72, 3.95, 3.72
ts, dried, stewed	3.51, 3.37, 3.30, 3.40, 3.40, 3.30
t Nectar (pulp, juice, sugar, water), ...	3.78
root crackers	6.63, 6.80, 6.72
root gruel	6.37, 6.57, 6.67, 6.87
okes, French, cooked	6.00, 5.75, 5.70, 5.81, 5.80, 5.75
okes, Jerusalem, cooked	6.00, 5.93, 6.00, 6.00, 5.98, 5.93
agus, cooked	6.03, 6.13, 6.10, 6.16, 6.10, 6.10
agus, frozen, cooked	6.42, 6.35, 6.39, 6.48, 6.40, 6.43
agus, green, canned	5.21, 5.32, 5.23, 5.30, 5.20, 5.30
agus, strained, Clapp	5.09, 5.09, 5.09, 4.82, 5.09, 4.80
dos, Cuban	6.47, 6.27, 6.42, 6.27, 6.58, 6.54
soup, unstrained, Clapp	5.00, 5.00, 5.00, 5.00, 5.00, 5.00
, broiled	5.80, 5.20, 5.80, 6.12, 6.10, 6.00
, Canadian. broiled	5.70, 5.60, 5.43, 5.57, 5.50, 5.73
a Nectar (pulp, juice, fruit acids, sugar, er), Hawaii	3.00
as, red	4.58, 4.62, 4.62, 4.65, 4.68, 4.75
as, yellow	5.21, 5.29, 5.00, 5.12, 5.04, 5.10
, cooked	5.19, 5.25, 5.32, 5.28, 5.32, 5.29
sea, broiled	6.70, 6.70, 6.64, 6.70, 6.58, 6.68
striped, broiled	6.60, 6.50, 6.60, 6.58, 6.60, 6.70
, black, cooked	5.82, 5.78, 5.93, 6.00, 5.98, 6.02
, Boston-style, home-baked	5.05, 5.09, 5.12, 5.15, 5.12, 5.12
, Boston-style, com.	5.42

ata is presented for the edible portion of foods in the raw state unless otherwise ated. Cooking signifies boiling unless otherwise specified. The general order follows: raw, home-cooked, frozen, canned, commercial (com.), dried, etc. names are italicized. Bridges, M. A., and Mattice, M. R.: Am. Jour. Digets , 440, 1939.

Item.	pH
Beans, pork and tomato sauce, canned	[illegible]
Beans, vegetarian, tomato sauce, canned	[illegible]
Beans, kidney, cooked	5.85, 5.90, 6.00, 6.01, [illegible]
Beans, lima, green, cooked	6.19, 6.21, 6.30, 6.19, [illegible]
Beans, lima, frozen, cooked	6.50, 6.56, 5.75, 6.67, [illegible]
Beans, lima, canned	5.76, 5.78, 5.86, 5.90, [illegible]
Beans, lima, dried, cooked	6.12, 6.40, 6.37, [illegible]
Beans, navy, cooked	5.96, 6.00, 6.01, [illegible]
Beans, string, cooked	5.73, 6.73, 5.86, 6.08, [illegible]
Beans, string, canned	[illegible]
Beans, string, chopped, Clapp	5.01, 5.01, 5.01, 5.01, [illegible]
Beans, string, puréed, Stokely	4.66, 4.96, 5.00, 4.80, [illegible]
Beans, string, strained, Clapp	5.08, 5.08, 5.08, 5.08, [illegible]
Beans, wax, cooked	5.52, 5.50, 5.58, 5.61, [illegible]
Beef broth, Clapp	6.14, 6.18, 6.14, 6.20, [illegible]
Beef with vegetables, chopped, Clapp	5.50, 5.50, 5.49, 5.50, [illegible]
Beef with vegetables, strained, Clapp	5.17, 5.17, 5.18, 5.18, [illegible]
Beef, filet mignon, broiled	[illegible]
Beef, pot-roasted	[illegible]
Beef, ribs, roasted	6.22, 6.50, 5.92, [illegible]
Beef, round, chopped, broiled	6.23, [illegible]
Beef, scraped, raw	[illegible]
Beef, steak, round, broiled	[illegible]
Beefsteak, sirloin, broiled	6.30, [illegible]
Beet greens, cooked	6.62, 6.58, 7.01, 6.70, 6.70, [illegible]
Beets, cooked	5.23, 5.52, 5.72, 5.41, 5.82, [illegible]
Beets, canned	4.95, 4.97, 4.98, 4.97, 4.97, [illegible]
Beets, chopped, Clapp	5.56, 5.56, 5.56, 5.56, 5.32, [illegible]
Beets, strained, Clapp	5.56, 5.56, 5.56, 5.56, 5.32, [illegible]
Bouillon, com.	4.90, [illegible]
Blackberries, Washington	4.40, 4.50, 4.40, 4.40, 4.25, [illegible]
Blueberries, Maine	3.22, 3.32, 3.12, 3.22, 3.18, [illegible]
Blueberries, frozen	3.35, 3.17, 3.11, 3.16, 3.20, [illegible]
Bluefish (Boston), filet, broiled	6.50, 6.30, 6.10, 6.13, 6.09, [illegible]
Brambleberry (wild) jelly	3.15
Bran Flakes	5.45, 5.45, 5.60, 5.67, 5.50, [illegible]
Bread, Boston brown	6.53
Bread, corn	6.17
Bread, cracked wheat	5.43, 5.50
Bread, pumpernickel	4.40
Bread, rye	5.46, 5.90, 5.48, 5.20, 5.60, [illegible]
Bread, white	5.42, 5.50, 5.65, 5.29, 5.43, 5.36
Bread, whole wheat	5.60, 5.48, 5.85, 5.60, 5.47, 5.61
Breadfruit, cooked	5.33
Broccoli, cooked	6.41, 6.46, 6.52, 6.32, 6.40, [illegible]
Broccoli, frozen, cooked	6.20, 6.88, 6.43, 6.50, 6.43, [illegible]
Brussels sprouts, cooked	6.05, 6.15, 6.00, 6.01, 6.05, [illegible]
Buttermilk	4.48, 4.42, 4.45, 4.41, 4.83, 4.42
Cabbage, green	5.90, 6.13, 6.18, 5.90, 5.79, [illegible]
Cabbage, green, cooked	6.77, 6.82, 6.70, 6.65, 6.38, [illegible]
Cabbage, red	5.43, 5.82, 5.86, 6.00, 5.75, [illegible]
Cabbage, red, cooked	6.31, 6.31, 6.42, 6.31, 6.21, 6.41
Calamondin juice	2.59, 2.51, 2.60, 2.48, 2.41, [illegible]
Calamondin marmalade, com.	[illegible]
Calves' liver, broiled	6.45, 5.90, 6.10, 5.90, [illegible]
Cantaloupe	6.57, 6.28, 6.43, 6.17, 6.58, [illegible]
Carrots	6.00, 5.88, 5.98, 5.99, 5.96, [illegible]
Carrots, cooked	5.70, 5.80, 5.88, 5.62, 5.58, [illegible]
Carrots, canned	5.20, 5.22, 5.20, 5.18, 5.19, [illegible]
Carrots, chopped, Clapp	5.56, 5.56, 5.56, 5.56, 5.30, [illegible]
Carrots, puréed, Stokely	4.55, 4.75, 5.00, 4.72, 4.74, [illegible]
Carrots, strained, Clapp	5.10, 5.10, 5.10, 5.10, 5.10, [illegible]
Cauliflower, cooked	6.45, 6.48, 6.67, 6.72, 6.71, [illegible]
Cauliflower, frozen, cooked	6.07, 6.02, 6.10, 5.90, 5.95, [illegible]
Caviar, American	[illegible]

Item.	pH
	5.88, 6.00, 5.86, 5.70, 5.96, 5.96
ked	5.37, 5.38, 5.50, 5.80, 5.92, 5.70
bage	5.92, 6.02, 6.22, 6.26, 6.28, 6.26
b (celeriac), cooked	5.80, 5.71, 5.65, 5.71, 5.79, 5.71
ained, Clapp	6.44, 6.44, 6.44, 6.44, 6.20
iss, cooked	6.78, 6.28, 6.25, 6.25, 6.30, 6.17
cooked	6.30, 6.05, 6.00, 6.13, 6.18, 5.90
merican, mild, Kraft	4.90
amembert	7.44
heddar, English	5.90
ottage	5.02, 5.02, 4.75
ream, Philadelphia	4.79, 4.10, 4.45, 4.88
Edam	5.40
ld English, Kraft	6.15
oquefort	5.41, 5.64, 5.98, 5.93, 6.10, 5.41
nappy, Kraft	5.18, 5.21
tilton	5.70
wiss Gruyere	6.62, 5.17, 5.77, 5.68, 5.73
California	4.54, 4.16, 4.15, 4.06, 4.01, 4.08
, frozen	3.37, 3.35, 3.32, 3.35, 3.35, 3.35
, sour, red, New York	3.20, 3.12, 3.20
, black, canned	3.89, 3.93, 3.86, 3.87, 3.88, 3.82
, Maraschino, com.	3.52, 3.50, 3.50, 3.50, 3.49, 3.47
, red, water-pack	3.29, 3.29, 3.25, 3.32, 3.32, 3.32
, *Royal Anne*, com..	3.80, 3.80, 3.82, 3.83, 3.80, 3.83
, broiled	6.50, 6.26, 6.28, 6.08, 6.13, 6.20
, *also see* Fowl.	
liver, broiled	5.99, 6.20, 6.10
	5.90, 6.05, 6.05, 5.89, 5.89, 6.05
	5.64, 5.75, 5.25, 6.10, 6.31, 5.81
	6.40, 6.58, 6.60, 7.02, 6.58, 6.63
ut, fresh	5.90, 6.00, 6.00, 6.52, 6.18, 6.00
ut water	5.04
n, boiled	5.32
s	7.52, 8.20, 8.40, 8.06, 8.10, 8.07
golden bantam, cooked on cob	6.76, 7.04, 6.35, 6.81, 6.22, 7.00
frozen, cooked	7.33, 7.44, 7.50, 7.57, 7.60, 7.68
canned	6.09, 6.44, 6.07, 6.07, 5.90
lakes	5.38, 5.00, 4.88, 4.90, 4.97, 4.85
d beef, brisket, boiled	6.13
d beef, pressed, canned	5.75, 5.79, 5.85, 5.96, 6.01, 6.00
pple jelly, com.	3.02, 2.98, 2.97, 3.00, 3.00
eat, cooked	6.62, 6.77, 6.92, 6.97, 6.93, 6.98
erry juice, canned	2.40, 2.52, 2.35, 2.31, 2.30, 2.30
erry sauce, com.	2.40
, 20 per cent	6.52, 6.62, 6.68, 6.52, 6.50, 6.53
, 40 per cent	6.44, 6.60, 6.60, 6.52, 6.48, 6.50
of Wheat, cooked	6.06, 6.10, 6.15, 6.16, 6.16, 6.10
bers	5.70, 5.78, 5.18, 5.52, 5.18, 5.55
bers, pickled	2.70
bers, pickled, bread-and-butter type	3.68, 3.70
t, black, jam	3.78
Dromedary	4.58, 4.74, 4.81, 4.88, 4.80, 4.82
roasted	6.62, 6.40, 7.02, 6.28, 6.00, 6.02
new-laid, whole	6.58
white	7.96
yolk	6.10
also see Table 61.	
nt, cooked	5.41, 5.41, 5.49, 5.45, 5.45, 5.33
lle	5.70, 5.92, 5.92, 5.92, 6.00, 5.95
(1:8, cooked ½ hour)	5.98, 5.98, 5.80, 5.82, 5.94, 6.02
(anise)	5.48, 5.62, 6.72, 5.78, 5.88, 5.87
, cooked	6.02, 6.00, 5.80, 5.88, 5.95, 5.88
Calimyrna	5.05, 5.08, 5.08, 5.18, 5.27, 5.10
anned	5.00, 5.00, 4.92, 5.00, 4.98, 4.98
haddie, boiled	6.28, 6.55, 6.43, 6.40, 6.33, 6.30

Item.	pH
Flounder, boiled	6.90, 6.73, 6.60, [illegible]
Flounder, filet, broiled	6.89, 6.39, [illegible]
Fowl, boiled	6.20, 6.10, 6.70, [illegible]
Frankfurters, boiled	6.10, 6.18, 6.15, [illegible]
French Dressing, Kraft	
Fruit, mixed, dried, stewed (apricots, prunes,	[illegible]
peaches, apples)	3.53, 3.59, 3.50, 3.27, [illegible]
Gelatin, plain jell	[illegible]
Gelatin dessert:	
Lime	[illegible]
Raspberry	[illegible]
Sherry-wine	[illegible]
Golden berries (South Africa), canned	[illegible]
Goose, roasted	5.96, 5.90, 5.98, 6.00, [illegible]
Gooseberry jam, com.	[illegible]
Graham crackers	7.12, 7.10, 7.10, [illegible]
Grape juice, com.	[illegible]
Grape juice (dil. 1:1)	[illegible]
Grapes, Concord	2.79, 3.00, 2.95, 2.91, [illegible]
Grapes, lady finger	3.55, 3.58, 3.53, 3.53, [illegible]
Grapes, Malaga	3.73, 3.71, 3.78, 3.71, [illegible]
Grapes, Niagara	2.80, 2.86, 3.14, 3.10, [illegible]
Grapes, Ribier	3.73, 3.80, 3.77, 3.75, [illegible]
Grapes, seedless	3.81, 2.90, 3.12, 3.28, [illegible]
Grapes, Tokay	3.72, 3.50, 3.59, 3.64, [illegible]
Grapefruit	3.70, 3.42, 3.75, 3.22, 3.31, [illegible]
Grapefruit, canned	3.10, 3.08, 3.29, 3.32, [illegible]
Grapefruit juice, canned	3.25, 3.18, 3.00, 2.90, 2.90, [illegible]
Grapenuts	5.40, 5.22, 5.18, 5.20, 5.15, [illegible]
Greens, mixed, chopped, Clapp	5.22, 5.22, 5.22, 5.22, 5.05, [illegible]
Greens, mixed, strained, Clapp	5.30, 5.30, 5.30, 5.30, 5.22, [illegible]
Grenadine syrup, Giroux	[illegible]
Guava jelly, com.	[illegible]
Guava Nectar (pulp, juice, fruit acids, sugar,	
water), Hawaii	[illegible]
Guavas, canned	[illegible]
Haddock, filet, broiled	6.48, 6.21, 6.17, 6.82, 6.40, [illegible]
Ham, fresh, baked	5.90, 6.10, [illegible]
Ham, smoked, baked	5.80, 5.80, [illegible]
Ham, smoked, boiled	[illegible]
Hamburger, broiled	6.22, [illegible]
Hominy grits, cooked	5.99, 6.00, 6.02, 6.20, 6.02, [illegible]
Honey	3.70, 3.90, 3.78, 3.78, 3.75, [illegible]
Horseradish, freshly ground	[illegible]
Horseradish, prepared, com.	[illegible]
Huckleberries, cooked with sugar	3.38, [illegible]
Junket-type dessert:	
Raspberry	[illegible]
Vanilla	[illegible]
Kale, cooked	6.70, 6.77, 6.80, 6.38, 6.38, [illegible]
Karo syrup	[illegible]
Ketchup, com.	3.89, [illegible]
Kippered herring, Marshall	6.10, 5.87, 6.10, 6.17, 6.14, [illegible]
Kohlrabi, cooked	5.72, 5.72, 5.72, 5.82, 5.82, [illegible]
Kumquats, Florida	3.70, 4.25, 3.80, 3.64, 4.03, [illegible]
Lamb chops (rib), broiled	5.25, 6.57, 6.00, 5.55, [illegible]
Lamb kidneys, broiled	6.51, [illegible]
Lamb, rack, roasted	[illegible]
Lamb with vegetables, chopped, Clapp	5.98, 6.01, 6.01, 6.01, 5.90, [illegible]
Leeks	5.77, 5.97, 5.51, 6.07, 5.72, [illegible]
Leeks, cooked	6.12, 5.79, 6.05, 6.05, 6.05, [illegible]
Lemon juice	2.05, 2.05, 1.98, 2.10, 2.05, [illegible]
Lemon juice, canned	[illegible]
Lentils, cooked	6.83, 6.32, 6.36, 6.32, 6.35, [illegible]
Lettuce, Boston	6.05, 6.09, 5.89, 5.98, 6.00, [illegible]
Lettuce, iceberg	6.00, 5.70, 5.70, 6.06, 6.13, [illegible]

Item.	pH
	2.10, 2.00, 2.00, 2.11, 2.15, 2.25
uice	2.50, 2.45, 2.42, 2.41, 2.51, 2.40
, Clapp	5.60, 5.60, 5.60, 5.60, 5.58, 5.59
vegetables, Clapp	5.29, 5.31, 5.31, 5.31, 5.35, 5.35
	5.40, 5.60, 5.72, 5.75, 5.72, 5.82
ooked	7.26, 7.30, 7.17, 7.43, 7.28, 7.10
boiled	6.39, 6.41, 5.60, 6.00, 5.10, 6.00
king, broiled	6.50, 6.43, 6.47, 6.26, 6.33, 6.37
Spanish, broiled	6.36, 6.07, 6.14, 6.22, 6.10, 6.26
8, cooked ½ hour)	5.81, 5.85, 5.89, 5.90, 5.86, 5.90
Florida	3.40, 4.43, 3.97, 4.41, 4.63, 4.17
up	5.15
	5.70
ast	5.08, 5.30
asaba	5.90, 5.78, 5.57, 5.62, 5.58, 6.00
oney dew	6.43, 6.00, 6.42, 6.67, 6.28, 6.50
ersian	6.30, 6.23, 6.09, 5.90, 6.29, 6.38
ade A (New York)	6.68, 6.68, 6.68
ade B (New York)	6.62, 6.69, 6.70, 6.77, 6.68, 6.25
dophilus	4.13, 4.25, 4.15, 4.15, 4.09, 4.09
densed	6.33
aporated	6.01, 6.10, 6.11, 6.13, 6.11, 5.98
at's	6.48
tonized	7.10
r, fine curd	5.65, 5.50
ar, precipitated curd	5.10, 4.70
ly, com.	3.01
	5.63, 4.67, 5.20, 5.27, 5.32, 5.32
ms, cooked	6.21, 6.20, 6.17, 6.18, 6.18, 6.22
om soup, cream of, canned	5.95
	6.20, 6.35, 6.58, 6.85, 6.85, 6.60
l, prepared, com.	3.55
nes	4.18, 3.94, 3.92, 3.97, 3.92, 4.06
s, boiled	6.21, 6.30, 6.08, 6.08, 6.30, 6.50
al (1:8, cooked ½ hour)	6.30, 6.29, 6.28, 6.20, 6.20, 6.60
ooked	6.42, 6.57, 6.42, 6.57, 6.62, 6.31
green	3.38, 4.00
green, ripe	6.80
ripe, processed	6.00
, red	5.32, 5.41, 5.39, 5.39, 5.52, 5.39
, white	5.48, 5.37, 5.50, 5.59, 5.85, 5.71
, yellow	5.32, 5.47, 5.58, 5.42, 5.32, 5.60
, pickled	2.71
s, Fla., "color added," Pinellas County	3.90, 3.60, 3.60, 3.63, 3.67, 3.75
s, Fla., not colored, Phillipi River	3.93, 3.69, 4.34, 3.60, 3.88, 3.97
juice, California	4.19, 3.90, 3.59, 3.85, 3.63, 4.34
juice, Florida	4.15, 3.97, 3.30, 3.58, 3.33, 3.40
marmalade, com.	3.00, 3.20, 3.23, 3.33, 3.16, 3.14
plant, cooked	5.72, 5.80, 5.75, 5.80, 5.75, 5.79
	5.72, 6.10, 6.02, 5.98, 6.17, 5.68
	5.62, 5.72, 5.50, 5.39, 5.50, 5.20
marmalade, com.	4.00, 3.53
	5.82, 5.97, 6.03, 5.90, 5.62, 5.78
s, cooked	5.45, 5.50, 5.65, 5.40, 5.60, 5.61
Fruit Nectar (pulp, juice, fruit acids, r, water), Hawaii	2.80
e foie, American	5.90
s	4.05, 3.39, 3.50, 3.30, 3.62, 3.55
s, cooked with sugar	3.55, 3.72
s, frozen	3.30, 3.30, 3.28, 3.35, 3.27, 3.32
s, canned	3.80, 3.74, 3.73, 3.82, 3.75, 3.70
Nectar (pulp, juice, sugar, water), com.	4.03
butter	6.28
Bartlett	4.08, 4.00, 4.00, 3.69, 3.67, 3.49
Royal Riviera, Oregon	4.48, 4.64, 4.40, 4.35
sickle, cooked with sugar	4.21, 4.20, 4.09, 4.05, 4.04, 4.09

Item.	pH
Pears, canned	4.07, 4.03, 4.03, 4.08, 4 [illegible]
Pear Nectar (pulp, juice, sugar, water), com.	[illegible]
Pea soup, cream of, canned	[illegible]
Peas, cooked	6.88, 6.61, 6.83, 6.22, 6 [illegible]
Peas, frozen, cooked	6.62, 6 [illegible]
Peas, canned	6.00, 5.90, 5.85, 5.71, 5 [illegible]
Peas, puréed, Stokely	4.90, 5.72, 5.85, 5.72, 5 [illegible]
Peas, strained, Clapp	5.91, 6.10, 5.97, 6.12, 6 [illegible]
Peas, dried (split green), cooked	6.80, 6.50, 6.53, 6.49, 6 [illegible]
Peas, dried (split yellow), cooked	6.62, 6.50, 6.47, 6.45, 6 [illegible]
Pep	5.85, 5.39, 5.45, 4.49, 4 [illegible]
Peppers, green	5.23, 5.20, 5.93, 5.48, 5 [illegible]
Persimmons	5.42, 5.50, 5.81, 5.55, 5 [illegible]
Pettijohn's (1:8, cooked ½ hour)	6.29, 6.29, 6.30 6.26, 6 [illegible]
Pimento, canned	4 [illegible]
Pineapple	3.38, 3.62, 3.27, 3.20, 3.64, [illegible]
Pineapple, canned	3.42, 3.50, 3.47, 3.42, 3.40, [illegible]
Pineapple juice, canned	3.37, 3.50, 3.52. 3.50, 3.55, [illegible]
Plums, blue	3.39, 2.86. 2.78. 3.10, 2.95, [illegible]
Plums, Damson	3.08. 3.00, 2.90. 3.00, 3.10 [illegible]
Plums, green gage	3.60, 3.95, 3.62. 4.23, 4.29, [illegible]
Plums, green gage, canned	3.29, 3.22, 3.26, 3.22, 3.22, [illegible]
Plums, red	4.95, 3.62, 4.02, 5.28, 3.78, [illegible]
Plums, yellow	4.45, 4.12, 4.15. 4.18, 4.63, [illegible]
Plums, frozen	3.29, 3.22, 3.42. 3.30, 3.32, [illegible]
Plums, spiced, com.	3 [illegible]
Plum Nectar (pulp, juice, sugar, water). com.	3 [illegible]
Pollack, filet, broiled	6.72, [illegible]
Pomegranate	3.00, 3.10. 3.03, 2.98, 2.93, [illegible]
Porgy, broiled	6.47, 6.43, 6.49, 6.43, 6.40, [illegible]
Pork chop, broiled	6.53, [illegible]
Pork tenderloin, fresh, baked	6.83, [illegible]
Potatoes, see Table 62.	
Prunes, dried, stewed	3.84, 3.92, 3.72, 3.72, 3.76, 3 [illegible]
Prunes, chopped, Clapp	3.68, 3.68, 3.65, 3.64, 3.75, 3 [illegible]
Prunes, puréed, Stokely	3.82, 3.83, 4.00, 3.63, 3.60, 3 [illegible]
Prunes, strained, Clapp	3.68, 3.83, 3.68, 3.68, 3.75, 3 [illegible]
Prune juice, home-made	3.97, 3.96, 3.97, 3.95. 3.95 3 [illegible]
Prune juice, com.	3 [illegible]
Puffed Rice	6.27, 6.40, 6.27, 6.34, 6.34, 6 [illegible]
Puffed Wheat	5.61, 5.58, 5.77, 5.70, 5.32, 5 [illegible]
Quince, fresh, stewed	3.37, 3.12, 3.16, 3.20, 3.20, 3 [illegible]
Quince jelly, com.	3 [illegible]
Radishes, red	5.85, 5.90, 6.05. 5.98, 6.04, 6 [illegible]
Radishes, white	5.58, 5.61, 5.69, 5.57, 5.52, 5 [illegible]
Raisins, seedless	4.10, 3 [illegible]
Ralston (1:8, cooked ½ hour)	6.19, 6.21, 6.24, 6.35, 6.30, 6 [illegible]
Raspberries, California	3.70, 3.88, 3.91, 3.62, 3.93, 3 [illegible]
Raspberries, New Jersey	3.72, 3.50, 3.50, 3.74, 3.82, 3 [illegible]
Raspberries, frozen	3.22, 3.18, 3.21, 3.20, 3.26, 3 [illegible]
Raspberry jam, com.	2.87, 3.06, 3.07, 3.10, 3.17, 3 [illegible]
Red pepper relish, com.	3.62, 3 [illegible]
Rhubarb, California, stewed	3.27, 3.34, 3.26, 3.24, 3.27, 3 [illegible]
Rice, brown, cooked	6.25, 6.42, 6.47, 6.60, 6.70, 6 [illegible]
Rice, white, cooked	6.50, 6.68, 6.15, 6.20, 6.00, 6 [illegible]
Rice, wild, cooked	6.08, 6.23, 6.30, 6.33, 6.47, 6 [illegible]
Rice Krispies	5.70, 5.73, 5.42, 5.60, 5.40, 5 [illegible]
Rolls, white	5.52, 5.52, 5 [illegible]
Romaine	5.90, 5.78, 5.98, 5.92, 6.06, 6 [illegible]
Salmon, fresh, boiled	6 [illegible]
Salmon, fresh, broiled	6.38, 6 [illegible]
Salmon, red Alaska, canned	6.17, 6.07, 6.07, 6.10, 6.16, 6 [illegible]
Sardines, Portuguese, in olive oil	5.72, 5.42, 5.77, 5.79, 5.93, 5 [illegible]
Saltines	6.89, 6.05, 6.00, 6.80, 6.70, 6 [illegible]
Sauerkraut, cooked	3.50, 3.45, 3.46, 3.45, 3.47, 3 [illegible]
Sausage, pan-broiled	6.74, 6 [illegible]

Item.	pH
th, com.	5.92
sautéd	5.90, 5.90, 5.87, 5.87, 5.70, 5.83
ooked	5.60, 5.70, 5.62, 5.60, 5.53, 5.60
aspberry, com.	3.69
Ralston	5.50, 5.49, 5.50, 5.53, 5.32, 5.60
Wheat	6.05, 6.05, 6.38, 6.20, 6.18, 6.49
oiled	7.39, 7.40, 7.19, 7.41, 7.79, 7.45
utéd	6.67, 6.76, 6.87, 6.90, 6.76, 6.86
kers	6.83, 5.65, 6.40, 7.08, 7.32, 7.08
	3.27, 2.98, 3.20, 3.13, 3.13, 3.01
oked	3.60, 3.72, 3.78, 3.80, 3.65, 3.49
, Chinese	4.70, 4.30
, cooked	6.40, 6.40, 6.17, 6.27, 5.97, 6.27
cooked	7.10, 7.18, 6.60, 6.60, 6.60, 6.65
frozen, cooked	6.52, 6.37, 6.47, 6.33, 6.30, 6.35
chopped, Clapp	5.52, 5.52, 5.51, 5.52, 5.38, 5.40
puréed, Stokely'	5.50, 5.98, 6.22, 5.75, 5.78, 5.78
strained, Clapp	5.70, 5.70, 5.70, 5.70, 5.63, 5.63
frumenti	4.15
acorn, cooked	5.61, 5.69, 6.12, 6.49, 5.65, 5.18
Hubbard, cooked	6.15, 6.12, 6.15, 6.00, 6.20, 6.05
white, cooked	5.52, 5.58, 5.70, 5.60, 5.58, 5.70
yellow summer, cooked	5.94, 5.79, 6.00, 5.98, 5.85, 5.88
rries, California	3.32, 3.50, 3.49, 3.49, 3.45, 3.33
rries, frozen	3.32, 3.27, 3.22, 3.22, 3.25, 3.21
rry jam, com.	3.00, 3.40, 3.33, 3.36, 3.40, 3.36
eads broiled	6.70, 6.60, 7.10
hard, cooked	6.78, 6.28, 6.25, 6.25, 6.30, 6.17
nes	4.48, 4.43, 3.93, 4.47, 3.97, 3.32
oes	4.22, 4.75, 4.32, 4.35, 3.99, 4.19
oes, local, vine-ripened	4.45, 4.17, 4.17, 4.08, 4.12, 4.02
oes, canned	4.28, 4.10, 4.14, 4.14, 4.14, 4.23
oes, strained, Clapp	4.18, 4.13, 4.13, 4.13, 4.12, 4.12
o juice, canned	4.10, 4.11, 4.14, 4.14, 4.28, 4.28
o paste, Italian	4.12
o purée, com.	4.10, 4.17, 4.10, 4.10, 4.19, 4.10
o soup, cream of, canned	4.62
e, smoked, boiled	6.28, 5.90, 5.77
sea, sautéd	6.32, 6.30, 6.33, 6.20, 6.27, 6.23
ish, canned	6.10, 6.10, 5.92, 6.12, 6.02, 6.00
greens, cooked	5.91, 5.96, 6.30, 6.21, 6.25, 6.17
s, white, cooked	5.82, 5.76, 5.85, 5.65, 5.64, 5.85
s, yellow, cooked	5.73, 5.75, 5.70, 5.82, 5.67, 5.57
y, roasted	6.80, 6.43, 5.90, 5.72, 7.00, 6.63
hop, broiled	6.12, 5.90
utlet, breaded	6.80, 5.90
idneys, broiled	6.60, 6.48
oasted	6.99, 6.74
ble soup, canned	5.16
ble soup, chopped, Clapp	5.00, 5.00, 5.00, 5.00, 5.00, 5.00
ble soup, strained, Clapp	5.00, 5.00, 5.00, 5.00, 4.99, 4.99
elli, cooked	6.50, 6.20, 6.33, 6.40, 5.80, 5.93
r, cider	3.12
ts, English	5.42
ress	5.88, 5.89, 5.89, 6.10, 5.90, 6.18
nelon	5.30, 5.25, 5.60, 5.18, 5.38, 5.29
Krispies	5.42, 5.62, 4.99, 4.99, 5.01, 4.95
na (1:8, cooked ½ hour)	5.85, 5.85, 5.80, 6.06, 6.03, 6.06
es	5.00, 5.12, 5.09
tershire sauce	3.63, 3.63, 3.67, 3.63, 3.63, 3.65
cooked	6.81, 5.79, 5.80, 5.80, 5.97, 6.55
Fleischmann's	5.65
berries, frozen	3.10, 3.00, 3.05, 3.07, 3.09, 3.00
ni, cooked	5.79, 5.15, 6.10, 6.00, 5.89, 5.99
ck	4.94, 4.87, 4.84, 4.90

Table 63.—pH of Reciped Foods and Soda Fountain Items.*

Item.	
Barley soup	[illegible]
Bisque tortoni	[illegible]
Blanc mange	[illegible]
Bread pudding, plain	[illegible]
Bread pudding, chocolate	[illegible]
Broth, beef, clear	5.54, [illegible]
Broth, beef, with rice	[illegible]
Broth, chicken	[illegible]
Broth, G. Washington's Aces	[illegible]
Butterscotch sauce	[illegible]
Cake, plain	[illegible]
Celery, creamed	[illegible]
Celery soup, cream of	[illegible]
Cheese Fondue	[illegible]
Cheese rarebit	5.08, [illegible]
Chocolate sauce	[illegible]
Chow mein, beef	[illegible]
Chocolate beverage (¾ milk and ¼ cream)	6.28, [illegible]
Chocolate beverage (condensed milk)	[illegible]
Cider, sweet, com.	[illegible]
Cider, sweet, Sterling, sparkling	3.52, [illegible]
Clam chowder, Manhattan	[illegible]
Club soda, "supercharged"	[illegible]
Boiled to remove CO_2	[illegible]
Cocoa beverage	6.45, [illegible]
Cocoa cream, Hoffman	[illegible]
Coca Cola, bottled, N. Y. C.	2.40, 2.65, 2.30, 2.56, 2.60, [illegible]
Coca Cola, fountain:	
Plain	2.46
With fresh lemon	[illegible]
Plain	[illegible]
With fresh lemon	[illegible]
Lemon juice used	[illegible]
Coffee, clear	4.83, 4.74, 4.83, 5.04, 4.78, [illegible]
Coffee, clear	4.97
With 20% cream	[illegible]
With milk	6.00
With evaporated milk	6.00
Coffee, clear	[illegible]
With 40% cream	[illegible]
Coffee, Barrington Hall (soluble):	
Clear	5.40
With cream	[illegible]
Clear	[illegible]
With cream	[illegible]
Clear	[illegible]
With condensed milk	[illegible]
Coffee, G. Washington's Aces (soluble):	
Clear	[illegible]
With cream	[illegible]
Clear	[illegible]
With milk	[illegible]
Clear	[illegible]
With condensed milk	[illegible]
Coffee, Sanka	[illegible]
Corned beef hash (with potatoes)	[illegible]
Corn soup, cream of	[illegible]
Custard, baked	6.75, 6.80, [illegible]
Eggnog	[illegible]
Eggs, omelette	[illegible]

* Bridges and Mattice: Am. Jour. Digest. Dis., 7, 440, 1939.

	pH
tem.	
bled (milk and butter)	7.23, 7.34
nks:	
ate	6.33, 6.33
berry	5.82
, Canada Dry	2.75, 2.71, 2.76, 2.78, 2.78, 2.68
plain mix (tested at Horton plant)	6.68
chocolate mix (tested at Horton	
	6.42
ha	6.00
raspberry	5.08, 5.15, 5.25
nel pecan	6.18
y	6.18, 6.13, 6.11, 6.12, 6.05, 6.16
late	6.42, 6.59, 6.68, 6.49, 6.88
e	6.23
n	6.58
berry	5.42, 5.32, 5.60, 5.67
la	6.05, 6.34, 6.25, 6.40, 6.53
sodas:	
olate	5.62, 5.80
e (whipped cream)	5.88
apple (no milk)	4.85
wberry, plain	4.75
Same with milk	5.20
rry	3.08
nge	2.82
everage, Hoffman	2.82
le	2.75, 2.70
	2.56
Milk, chocolate	6.48
Milk, chocolate (thick)	6.52
Milk, chocolate, with egg	6.70
bran	6.52
om soup, cream of	6.20
soup	6.07
ade	3.82, 3.85
nge juice base	3.75
Vanti	3.05, 3.17
p, cream of	6.17
p, split green	6.05, 6.00
ola	2.20
, beverage	5.52
, beverage, clear	5.42
th 20% cream	6.03
th evaporated milk	6.17
th milk	6.23
, beverage, clear	5.35
th 40% cream	6.20
s, Idaho, baked (with butter)	6.20, 6.40, 5.82, 6.03, 5.88, 5.90
s, Irish, baked (with butter)	5.23, 5.62, 6.30, 5.78, 6.02, 5.80
s, Irish, baked (with milk)	5.90, 5.98, 5.90, 5.92, 6.15, 6.18
s, Irish, boiled	5.58, 5.65, 5.91, 5.80, 6.02, 5.28
s, Irish, boiled (with milk)	6.03, 6.00, 5.93, 6.08, 6.22, 5.70
s, Irish, mashed (with milk and butter)	5.83, 5.93, 5.90, 5.90, 5.80, 5.89
s, sweet, baked (with butter)	5.35, 5.31, 5.29, 6.20, 5.70
s, sweet, boiled (with butter)	6.00, 5.88, 6.04, 5.98, 6.12, 5.98
s, sweet, canned	5.10
dding	6.41, 6.30, 6.50
eer, Canada Dry	4.40
dressing	4.08
rilla	4.38
Scotch style	7.03
soup, cream of	6.21
nd, brewed	2.75, 2.60, 2.82, 2.79, 2.78

Item	
Tapioca pudding, caramel	[illegible]
Tea, Orange Pekoe type (weak)	6.97, 6.83, 5.30, [illegible]
Tea, Orange Pekoe type (medium)	6.54, 6.43, 5.27, [illegible]
Tea, Orange Pekoe type (strong)	5.76, 5.90, 5.13, [illegible]
Tea, clear	[illegible]
With lemon	[illegible]
With 40% cream	[illegible]
Tea, clear	[illegible]
With lemon	[illegible]
With 20% cream	[illegible]
With evaporated milk	[illegible]
With milk	[illegible]
Tomato soup, cream of	[illegible]
Vegetable soup	[illegible]
Vegetable and barley soup	[illegible]
Vegetable-okra soup	[illegible]
Water, Kalak	[illegible]
Water, Sparkling, Canada Dry	5.35, 5.46, 5.35, 5.28, [illegible]
Water, "White Rock"	4.90, 4.76, 4.36, 4.22, [illegible]

Although difference in pH might be expected from sample to sample of the same item, remarkably little is encountered. For instance, the pH of Welsh rarebit removed from the hospital dining room was found to be 5.04 and nine months later a similar item was pH 5.08. Also, two bottles of grape juice of different brands both rated pH 3 and 3.05, 3.06 on dilution 1:1 with water, the tests being conducted over a year apart. These and similar observations would point to considerable consistency in the reaction of foods unless, of course, spoilage occurs.

Acid Activity.—Unfortunately acid concentration when directly expressed involves mathematical forms which are confusing to the uninitiated because of the smallness of the value stated. The term pH, has become increasingly popular without many who use it being aware of its real nature. One is dealing with the logarithmic function of the hydrogen-ion concentration, not with some simple arithmetic value easy to compare. To remedy this difficulty conversion tables follow and the name *Acid Activity* is given to the new term. It must be stressed that the term has no meaning with reference to these or any other data except as specifically stated. If the *Acid Activity* is multiplied by 10^{-7} (that is, 0.000 000 1) the result will approximate hydrogen-ion concentration in gram equivalents per liter.

To conserve space, Table 64 presents data only at 0.1 pH intervals. Where closer readings are desired, Table 65 shows the variation encountered with changes of 0.01 pH. Since the "whole number" in the pH value designates merely the positihn of the decimal point, the corresponding *acid activity* can be obtained by using the numerical sequence in Table 65 and placing the decimal as indicated in Table 64. For example, *acid activity* for a sample of plum juice at pH 4.32 is desired. The 4 is ignored and the .32 is found in Table 65 under 6.32 as equivalent to 4.786. Since pH 4.32 lies between 4.3 and 4.4 which are 501.2 and 398.1 respectively, its acid *activity* becomes 478.6 or approximately 480.

…E 64.—Acid Activity* Over pH Range of Foods Reported†

Acid activity.	pH	Acid activity.	pH.	Acid activity.
0.010	6.6	2.51	4.2	631.0
0.013	6.5	3.16	4.1	794.4
0.016	6.4	3.98	4.0	1,000.0
0.020	6.3	5.01	3.9	1,259.0
0.025	6.2	6.31	3.8	1,585.0
0.032	6.1	7.94	3.7	1,995.0
0.040	6.0	10.00	3.6	2,512.0
0.050	5.9	12.59	3.5	3,162.0
0.063	5.8	15.85	3.4	3,981.0
0.079	5.7	19.95	3.3	5,012.0
0.100	5.6	25.12	3.2	6,310.0
0.126	5.5	31.62	3.1	7,944.0
0.159	5.4	39.81	3.0	10,000.0
0.200	5.3	50.12	2.9	12,590.0
0.251	5.2	63.10	2.8	15,850.0
0.316	5.1	79.44	2.7	19,950.0
0.398	5.0	100.00	2.6	25,120.0
0.501	4.9	125.90	2.5	31,620.0
0.631	4.8	158.50	2.4	39,810.0
0.794	4.7	199.50	2.3	50,120.0
1.000	4.6	251.20	2.2	63,100.0
1.259	4.5	316.20	2.1	79,440.0
1.585	4.4	398.10	2.0	100,000.0
1.995	4.3	501.20	1.9	125,900.0

…e decimal point of *Acid Activity* is moved seven places to the left, the resultant …l be hydrogen-ion concentration (g. per liter).
…lges and Mattice: Am. Jour. Digest. Dis., **7**, 440, 1939.

TABLE 65.—Variation in Acid Activity* Over a pH Unit.†

Acid activity.	pH	Acid activity.	pH	Acid activity.	pH	Acid activity.
1.000	6.75	1.778	6.50	3.162	6.25	5.623
1.023	6.74	1.820	6.49	3.236	6.24	5.754
1.047	6.73	1.862	6.48	3.311	6.23	5.888
1.072	6.72	1.906	6.47	3.389	6.22	6.026
1.097	6.71	1.950	6.46	3.467	6.21	6.166
1.122	6.70	1.995	6.45	3.548	6.20	6.310
1.148	6.69	2.042	6.44	3.631	6.19	6.467
1.175	6.68	2.089	6.43	3.715	6.18	6.607
1.202	6.67	2.138	6.42	3.802	6.17	6.761
1.230	6.66	2.188	6.41	3.890	6.16	6.918
1.259	6.65	2.239	6.40	3.981	6.15	7.080
1.288	6.64	2.291	6.39	4.074	6.14	7.244
1.318	6.63	2.344	6.38	4.169	6.13	7.413
1.349	6.62	2.399	6.37	4.266	6.12	7.586
1.380	6.61	2.455	6.36	4.365	6.11	7.763
1.413	6.60	2.512	6.35	4.467	6.10	7.944
1.446	6.59	2.570	6.34	4.571	6.09	8.128
1.479	6.58	2.630	6.33	4.677	6.08	8.318
1.514	6.57	2.692	6.32	4.786	6.07	8.511
1.549	6.56	2.754	6.31	4.898	6.06	8.710
1.583	6.55	2.818	6.30	5.012	6.05	8.913
1.622	6.54	2.884	6.29	5.129	6.04	9.120
1.660	6.53	2.951	6.28	5.248	6.03	9.333
1.698	6.52	3.020	6.27	5.370	6.02	9.550
1.738	6.51	3.090	6.26	5.495	6.01	9.772

…he decimal point of *Acid Activity* is moved seven places to the left, the result…e will be hydrogen-ion concentration (g. per liter).
…dges and Mattice: Am. Jour. Digest. Dis., 7, 440, 1939.

To answer a question such as how much more acid is the pH 2.0 of lime juice than the pH 3.6 of orange juiceFrom Table 62, it will be seen that lime juice is roughly forty times as acid as orange juice since their *acid activities* are 100,000 and 2512 respectively.

If, then, anyone especially desires to have the "average" pH of any food from the series of determinations offered in Table 62, it will be necessary to compute the *acid activity*, average these numbers, then read back to the corresponding pH. All such data are approximations only.

Organic Acids in Foods.—According to Nelson, many erroneous statements regarding the incidence of specific acids in fruits have been retained in supposedly authoritative works. Malonic acid, for instance, is *not* found in fruits. Oxalic, benzoic, succinic and lactic acids never occur in large quantities. Despite reports to the contrary, Nelson insists that few fruits except the tamarind and grape (including raisins, of course), contain appreciable amounts of tartaric acid.

The two predominating acids in fruits and vegetables are malic and citric. The subsequent table which presents values for the acid components of a few fruits, vegetables, and miscellaneous foods is concerned, therefore, largely with these acids. The acidity of oranges, lemons, grapefruit, limes and most berries is almost entirely due to citric acid. This acid occurs free in tomatoes. Peaches, pears, and apricots contain malic as well as citric acid. Rhubarb, apples, and quinces owe their acidity to malic acid. Probably all the acid in cantaloupe is citric, that in watermelon malic (Bigelow and Dunbar). The "sand" seen in the sap of the sugar maple is calcium malate.

TABLE 66.—Organic Acid Constituents of Foods.*

Food items.	Citric acid, per cent.	Malic acid, per cent.	Other acids
. . . .	0.03	1.02	
s	None	0.27	
golden	None	0.72	
n	None	0.75	
h	None	0.72	
eauty	None	0.78	
p	Trace	0.50	
transparent	0.02	0.97	
canned	1.06	0.33	
. . . .	0.35	0.81	Trace of oxalic.
s	0.10	0.17	Trace of tartaric.
s	0.11	0.10	
. . . .	None	None	Trace of tartaric.
. . . .	..	0.24	
. . . .	0.15	0.50	
. . . .	0.32	0.37	
. . . .	0.07		
ma	0.65	0.17	
, green	0.03	0.13	
. . . .	Trace		
. . . .	0.11	None	
ries	Trace	0.16	Traces of oxalic and succinic, 0.92% isocitric.
ies	1.56	0.10	Trace of oxalic
. . . .	0.21	0.12	
sprouts	0.24	0.20	
e	0.14	0.10	
upe	..	None	
. . . .	0.09	0.24	
ower	0.21	0.39	
. . . .	0.01	0.17	
s	0.01	1.25	Trace of oxalic, 0.07% succinic, 0.13% lactic
es	None	0.56–1.99	
es, Montmorency, canned .	None	1.45	
hardshell, meat . . .	None		
or	None		
. . . .	0.53		
weet	None	None	
soft shell	None		
rries	1.82	0.46	0.07% benzoic.
rries	1.10	0.26	Benzoic, 0.065%; quinic, 1% (Isham, 1935).
bers	0.01	0.24	
ts	2.30	0.05	Traces of oxalic and succinic.
ts, canned	1.92	0.13	
nt	None	0.17	
. . . .	0.34	Trace	
erry	Present	0.50–2.08	
. . . .	..	0.65	0.43% tartaric.
, Concord	0.02	0.31	1.07% tartaric.
ruit	1.46		
ruit	1.33	0.08	
. . . .	0.35	0.05	
s	3.84	Trace	
e	6.08	0.29	

aken from Bigelow, W. D., and Dunbar, P. B.: Jour. Ind. Eng. Chem., **9**, 917. Nelson, E. K.: Am. Med., **23**, N.S., 812, 1928. Hartmann, B. G., and F.: Jour. Assn. Off. Agric. Chem., **17**, 522, 1934. The total acidity of fruits with the degree of ripeness and the difference in variety.

TABLE 66.—**Organic Acid Constituents of Foods.**—*Continued*

Food items.	Citric acid, per cent.	Malic acid, per cent.	Other acids.
Lettuce, head	0.02	0.17	
Loganberries	2.02	0.08	
Canned	1.82	0.33	
Malt	0.13		
Milk, whole	0.16		
Evaporated	0.36		
Milk, powdered, whole	1.30		
Skimmed	1.82		
Mushrooms	None	0.14	
Okra	0.02	0.12	
Onions	0.02	0.17	
Oranges	0.98	Trace	
Oranges, Florida	0.92	0.18	
Oysters, meat	0.03	0.18	
Liquor	None	0.01	
Parsnips	0.13	0.35	
Peaches	0.37	0.37	
Canned	0.05	0.69	
Pears	0.24	0.12	
Pears, Bartlett, canned	0.42	0.16	
Peas, fresh	0.11	0.08	
Persimmons, Japanese	..	0.09	
Pineapple	0.84	0.12	
Pineapple	0.77	0.12	
Plum	..	0.36-2.39	
Plum, California	0.03	0.92	
Damson	None	2.48	
Pomegranate	4.52	None	
Potatoes, Idaho	0.51	None	
Potatoes, sweet (Cuban)	0.07	None	
Prunes, Italian style	None	1.44	
Pumpkin	None	0.15	
Quince	None	1.59	
Quince	..	0.68	Trace of tartaric.
Raspberries, black	1.06		
Black, canned	0.81	0.05	Trace of tartaric.
Red	1.30	0.04	
Red, canned	1.28	0.05	
Rhubarb	0.41	1.77	0.12% oxalic.
Scallops	None		
Shrimps	None		
Spinach	0.08	0.09	
Squash	0.04	0.32	
Strawberries	0.91	0.10	
Strawberries	1.08	0.16	
Tamarind	Trace	0.50	Traces of oxalic and succinic, 7.76% tartaric.
Tomatoes	0.30	0.20	
Tomatoes	0.47	0.05	
Turnips, white	None	0.23	
Watermelon	..	0.20	
Wheat, bran	0.08		
Wheat-germ	0.34		
Wheat flour (patent)	None		
Whole wheat flour	0.05		
Youngberries, canned	0.62	0.24	
Yeast, dried brewer's	0.30	..	(Sherman, 1936.)

TABLE 67.—**The Metabolic Reaction of Foods.**

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
	..	13.6	1
	..	2.4	1
Kellogg	4.3	..	5
	2.2	..	1
		18.3	5
		12.0	13
		12.4	10
., salted	13.3	..	1
mpling	0.3	..	5
	..	4.5	13
	..	3.7	10
		0.8–1.4	1
		2.3–3.0	5
	..	2.4	5
	..	1.1	5
fresh, raw	..	6.8	8
		8.4	5
		4.8	1
ked	..	8.5	13
d	..	6.9	5
	..	41.9	5
		31.3	13
ked	..	17.4	5
ot starch	0.4	..	5
kes, French or globe	4.3	..	1
led	..	7.6	5
alem	..	10.3	1
iled	..	8.2	5
gus	1.0	..	1
		0.8	10
d	1.0	..	5
os	..	10.7	10
raw	5.0	..	13
	4.8–10.7	..	5
ed	10.0	..	13
l	12.9–40.8	..	5
ked	8.6	..	12
o shoots	..	7.7	14
ns	..	5.6	10
		7.9	5
		4.4	1
, pearled	10.4	..	13
	17.5	..	5
	13.8	..	1
ed	6.0	..	5
teamed	15.0	..	5
baked	..	2.8	5
d, boiled	..	1.7	5
er, boiled	..	6.0	5
aw	..	35.5	5
cot, boiled	..	5.0	5
aw	..	25.5	5
a, fresh	..	14.0	9
ried	..	41.6	10
ney, canned	..	3.0	13
., canned	..	6.4	13
ried	..	18.0	9
		23.9	6
, raw	..	5.4	13
		4.2	1
g	..	5.4	9
		4.1	1
te	4.3	..	1

TABLE 67.—**The Metabolic Reaction of Foods**.—*Continued.*

Food items.	Degrees of acidity.	Degrees of alkalinity.	[illegible]
Beef, blood	..	7.8	12
Boiled	25.2	..	5
Clear lean	12.0	..	9
Corned	13.7	..	5
Dried	14.8	..	13
Creamed	1.6	..	13
Heart	9.1	..	13
Juice	2.4	..	13
Lean	23.5	..	1
	13.9	..	10
Liver	10.1	..	13
Loin, med. fat	10.8	..	13
	38.6	..	1
Fat	9.5	..	13
Roast	19.0–23.5	..	5
Medium fat	8.1	..	1
Misc. fat-free cuts	11.5	..	13
Porterhouse	10.9	..	2
Ribs, med. fat	10.5	..	1
Cooked	13.8	..	1
Roast, fat	11.7	..	13
Round, lean	10.6	..	13
Steak	11.0	..	9
Steak, raw	18.5	..	5
Fried	17.3	..	5
Grilled	23.2	..	5
Stewed	28.9	..	5
Topside, boiled	28.9	..	5
Roast	20.4–22.2	..	5
Beef stew with pastry crust	8.8	..	5
With vegetables	..	2.0	13
Beer	0.3	..	1
Beets	..	10.9	10
		11.4	1
Boiled	..	8.9	5
Biscuit, baking powder	4.3	..	13
Blackberries	..	7.1	1
		8.4	5
Stewed	..	4.2	5
Blanc mange	..	2.3	5
Blueberry juice	..	2.8	14
Bologna	9.3	..	13
Bovril	..	51.0	5
Brains, calf, boiled	20.7	..	5
Sheep, boiled	17.7	..	5
Brazil nuts	10.9	..	1
		4.5	5
Bread, graham	6.8	..	13
Pumpernickel	..	4.3	1
Rye	6.8	..	13
Fine	2.6	..	12
Whole	6.0	..	12
White	2.7	..	6
	1.5	..	5
Fine	6.7	..	12
(Milk)	7.1	..	13
(Water)	6.0	..	9
	7.1	..	13
Whole wheat	7.3	..	13
	5.9	..	5
	3.0	..	6
Broccoli	..	3.6–4.9	3
Tops, boiled	..	4.3	5

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source o data.
prouts	..	4.3	1
	..	0.8	5
t, refined	7.3	..	1
	3.8	..	1
	0.4	..	5
	4.3	..	1
k	..	2.2	13
		1.3	1
	..	6.0	9
		4.3	10
		8.2	12
, boiled	..	1.4	5
, boiled	..	4.9	5
, red	..	2.2	1
		5.6	5
, Savoy	..	2.7	1
ed	..	2.8	5
late	3.6	..	13
	2.9	..	5
nut	1.1	..	5
nt	..	0.6	5
rbread	..	8.7	5
	4.3	..	13
re	10.7	..	5
upe	..	7.5	5, 9
ooked	19.5	..	1
en moss, dried	113.0*	..	5
s	..	10.8	10
		9.5	1
raw	..	9.0	5
iled	..	4.4	5
ng, boiled	..	5.9	5
ower	..	5.3	10
		3.0	1
		1.4	3
ed	..	1.7	5
	11.6	..	1
ac, boiled	..	8.8	5
, raw	..	8.4	5
		7.8	10
ched	..	11.1	1
ves and stalks	..	2.5	1
, boiled	..	5.0	5
	..	15.8	9
		24.6	14
e, cheddar	5.5	..	13
	5.4	..	5
tage (Skim milk)	4.5	..	1
am (English)	3.4	..	5
gonzola	0.3	..	5
yère	17.5	..	1
		3.6	5
d	19.8	..	1
mesan	2.1	..	1
		5.1	5
on	7.8	..	5
es, black	..	2.6	1
é	..	1.7	5
	..	2.1	1
		6.1	13
ewed	..	2.9	5
et	..	2.7	1
		7.3	5

r to page 123.

TABLE 67.—**The Metabolic Reaction of Foods.**—*Continued*

Food items.	Degrees of acidity.	Degrees of alkalinity.	[illegible]
Cherry juice	..	4.4	[illegible]
Chestnuts	..	7.4	[illegible]
		9.6	1
		11.3	6
Chicken, boiled	20.7	..	5
Broiler	10.8	..	13
Fat	24.3	..	1
Fowl, raw	9.6	..	13
Stewed	13.7	..	13
Roast	25.4	..	5
Salad	0.7		1[illegible]
Chicory (coffee substitute)	..	7.2	1
Chicory, white	..	2.3	1
		4.1	5
Chives, leaves	..	8.3	1
		12.6	14
Chocolate	8.1	..	1
		7.9	5
Milk	..	8.4	5
Chocolate blanc mange	..	1.4	13
		2.6	5
Chutney, apple	..	4.6	5
Tomato	..	5.3	5
Cider, apple	..	4.4	1
Grape (unfermented)	..	5.2	1
Citron	..	9.8	9
Citron, fresh unripe	..	6.9	15
Citron, preserved	..	8.3	15
Cocoa, beverage	..	2.9	13
Powder	..	0.7	5
Cocoanut	..	7.0	2
		4.9	5
Shredded	..	4.2	13
		4.1	1
Dried	..	8.5	5
Cocoanut milk	..	7.5	5
Cod, fresh	5.5	..	13
Steamed	16.2	..	5
Fried	15.6	..	5
Grilled	21.8	..	5
Roe, fried	38.8	..	5
Baked in vinegar	40.0	..	5
Codfish, salt, raw	12.6	..	13
Cooked	21.0	..	13
Coffee, roasted	..	63.4	5
		5.6	1
Beverage	..	0	5
Cookies:			
Chocolate drop	0.6	..	13
Hermit	3.0	..	13
Sugar, plain	0.5	..	13
Corn, green	1.8	..	2
Sweet	1.8	..	13
Dried	6.0	..	10
Corn cake (Johnny cake)	4.1	..	13
Corn Flakes	5.4	..	13
	2.0	..	5
Cornmeal	6.5	..	1
Yellow, raw	5.4	..	13
Cooked	1.0	..	13
Cornstarch	0.0	0.0	
Blanc mange	..	1.6	13

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
	..	0.8	1
ed	39.5	..	5
	7.8	..	10
	5.3	..	5
	8.5	..	13
	8.2	..	13
	8.2	..	13
es*	..	3.2	5
	..	3.2	1
		1.9	5
	..	0.6	13
	..	0.4	13
Wheat	10.2	..	12
rs, fresh	..	31.5	1
		3.2	5
		7.9	9
juice, red	..	4.9	14
, red	..	1.1	1
		6.3	14
		5.9	5
wed	..	4.3	5
	..	3.2	1
		8.8	5
wed	..	6.1	5
	..	4.4	1
		6.1	5
	..	0.7	13
	..	5.8	13
		21.8	5
l, baked	0.5	..	5
d	0.5	..	5
d apple	..	9.7	14
		11.9	5
ns	..	8.2	5
lion greens	..	17.5	1
en	..	15.0	14
	..	11.0	9
		12.4	5
		5.5	1
h, fried	20.5	..	5
nuts	7.3	..	13
	1.7	..	5
ng, meat or poultry	1.7	..	13
ng, beef	1.1	..	5
roast	24.4	..	5
ing	..	1.4	5
	7.0	..	1
	9.9	..	10
ed	8.5	..	5
hole	11.1	..	10
	24.5	..	1
	16.2	..	5
oiled	16.2	..	5
ied	16.5	..	5
oached	19.7	..	5
rambled	12.5	..	5
hite	4.8	..	13
	5.0	..	5
	5.2	..	10
	8.3	..	1
	25.3	..	13
	33.2	..	5
	26.7	..	10
	51.8	..	1

h alkaline *in vitro*, partly acid *in vivo*.

TABLE 67.—**The Metabolic Reaction of Foods.**—*Continued.*

Food items.	Degrees of acidity.	Degrees of alkalinity.	[illegible]
Eggnog	10.0	..	1
Eggplant	..	4.5	5
Endive	..	14.5	1
		5.4	5
French	..	2.3	1
Farina, raw	9.6	..	13
Cooked	1.6	..	13
Figs, dried	..	100.9	13
		10.0	2
		36.1	5
		27.8	1
Stewed	..	20.5	5
Filberts	2.1	..	1
Fish paste	10.3	..	5
Flounder, steamed	19.7	..	5
Fried	13.9	..	5
Flour:			
Buckwheat	6.9	..	13
Corn	..	0.6	5
Graham	11.2	..	13
Rye	11.3	..	1
White	9.6	..	13
	7.4	..	5
Wheat	11.6	..	10
Coarse	2.7	..	1
Entire	12.0	..	9
Whole	12.2	..	13
	3.4	..	5
Force	3.8	..	5
Frankfurters	10.2	..	13
Frogs' legs	15.8	..	1
	10.6	..	10
Fruit salad, canned	..	3.3	5
Fudge, chocolate	..	0.4	13
Gelatin dessert, lemon	..	0.5	13
Ginger, ground	..	21.6	5
Gingerbread	..	8.7	5
		17.0	13
Goose	24.5	..	12
Young	7.7	..	13
Roast	21.8	..	5
Gooseberries	..	7.6	1
		3.3	14
Green, raw	..	4.1	5
Stewed	..	2.1	5
Ripe	..	3.7	5
Gooseberry juice	..	4.3	14
Grapes	..	2.7	13
Black	..	7.2	5
White	..	6.0	5
Grape juice	..	3.9	13
Grapefruit	..	6.4	5
Grapenuts	..	1.4	5
Gravy, meat stock	7.0	..	13
Greengages	..	7.7	5
Grouse, roast	25.8	..	5
Guava	..	7.7	14
Guinea-fowl, roast	26.3	..	5
Haddock	8.5	..	11
	16.1	..	10
Steamed	17.7	..	5
Fried	14.0	..	5

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
smoked, steamed	19.7	..	5
amed	12.7	..	5
	14.8	..	5
	9.4	..	13
	9.2	..	11
l	18.6	..	5
led	10.0	..	13
lean	12.5	..	13
d, med. fat	8.3	..	13
l	9.7	..	2
	7.0	..	1
raw	7.6	..	5
ed	16.2–22.3	..	5
ast	30.0	..	5
l	28.1	..	5
	2.6	..	13
ts	2.1	..	1
	3.9	..	5
heep, roast	27.6	..	5
, fresh	12.7	..	1
	17.4	..	1
ed	10.0	..	11
	21.9	..	5
d in vinegar	23.8	..	5
fried	66.2	..	5
comb	1.1	..	5
ned	..	0.6	5
, dark:			
verage	..	2.1	4
ckwheat	..	0.4	4
atsclaw	..	1.9	4
oldenrod	..	1.1	4
Iixed flowers	..	4.6	4
ulip-popular	..	2.7	4
, light:			
verage	..	1.0	4
Iesquite	..	3.2	4
range	..	0.5	4
age	..	0.6	4
weet clover	..	0.4	4
upelo	..	0.8	4
Vhite clover	..	0.7	4
radish	..	5.8	5
		2.7	1
meat	6.9	..	1
eberries	1.4	..	1
-Toi (N. Y. C.)	..	14.3	14
eam, vanilla	..	0.5	13
		5.3	5
ruit with edible seeds	..	3.8	5
ne fruit*	..	2.8	5
oll	..	0.5	5
	..	4.0	12
		17.0	14
		8.3–12.7	3
y, sheep, raw	15.7	..	5
ried	31.0	..	5
raw	15.3	..	5
tewed	30.3	..	5
l	8.4	..	13
abi	..	6.0	1

* Plums are acidifying.

TABLE 67.—**The Metabolic Reaction of Foods.**—*Continued*

Food items.	Degrees of acidity.	Degrees of alkalinity.	[illegible]
Lamb, chops	9.3	..	13
Roast	10.7	..	13
Lard	1.6	..	5
	4.4	..	1
Leeks, bulbs	..	7.3	1
Boiled	..	5.5	5
Leaves	..	11.3	1
Lemonade	..	0.4	5
Lemons	..	5.5	10
		9.9	1
Incl. skin	..	8.5	5
Lemon juice	..	4.1	9
		3.8	5
Lentils, dried	5.2	..	13
		2.0	5
	17.8	..	1
Boiled	..	0.4	5
Lettuce	..	7.4	10
		14.1	1
		6.5	3
		6.8	14
		3.8	5
Lima, *see* Beans.			
Liver, beef, raw	10.1	..	13
calves', raw	9.4	..	13
	14.7	..	1
Raw	23.6	..	5
Calves', fried	49.5	..	5
Ox, fried	46.9	..	5
Lobster, boiled	38.4	..	5
Loganberries	..	7.4	5
Canned	..	2.5	5
Lotus, fresh	..	9.0	14
Macaroni, raw	9.6	..	13
	5.1	..	1
	3.8	..	5
Cooked	1.7	..	13
	1.2	..	5
Macaroni and cheese	..	2.1	13
		0.1	5
Mackerel	9.3	..	13
Fried	12.7	..	5
Mangos	..	5.0	14
Margarine	1.3	..	5
	7.3	..	1
Marmalade, orange	..	10.0	13
		2.8	5
Marmite (vegex)	..	17.1	5
Maté, dry leaves	..	25.5	1
Mayonnaise	1.4	..	13
Meat extracts	19.9-50.7	..	1
Meat paste	9.6	..	5
Milk:			
Skim	..	1.8	13
		2.9	5
Condensed	..	10.9	5
Top	..	1.2	13
Whole	..	1.8	13
		2.4	10
		2.7	5
		4.2	12

. Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
ole :			
ensed	..	4.5	13
		8 4	5
orated	..	4.6	13
d	..	21.6	5
at	..	12.2	5
	..	59.4	13
eacle.			
(1 egg)	4.5	..	13
ms	..	4.0	9
		1.8	1
		4.0	5
	1.6		5
elon	..	7.5	10
, boiled	28.7	..	5
d	30.8	..	5
d and cress	2.3	..	5
, chops, raw	4.5–12.1	..	5
ed	6.2–16.6	..	5
lled	8.0–17.0	..	5
	9.6	..	2
iled	22.5	..	5
ast	19.9	..	5
. fat	20.3	..	1
g and neck, stewed	20.3	..	5
ines	..	6.2	5
s	5.1	..	1
al, raw	12.9	..	10
	13.2	..	5
ked	2.0	..	13
idge	1.5	..	5
al cookies	0.6	..	5
hulled	10.0	..	12
	..	4.5	1
oil	..	< 0.1	5
, green	..	41.1	13
		45.0	9
		47.2	8
tled in brine	3.8	..	5
ette	10.2	..	5
eese	14.0	..	5
s	..	1.5	13
		0.5	5
led	..	0.2	5
ed	..	1.6	5
d	1.1	..	1
ing, raw	..	8.4	5
ges	..	5.6	10
		6.1	5
		9.6	1
ge juice	..	4.5	9
		4.5	5
ne	..	8.5	5
ngue	10.6	..	1
ubes	..	63.5	5
rs	15.0	..	9
	14.4	..	5
ids and liquor	10.3	..	1
akes	1.8	..	5
mps	..	11.9	9
		6.6	1
		7.5	5
iled	..	6.7	5
idge, roast	27.9	..	5
on fruit	..	8.5	5

TABLE 67.—**The Metabolic Reaction of Foods.**—*Continued.*

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
Pastry	4.4	..	13
Flaky, baked	4.6	..	5
Short, baked	5.4	..	5
Peaches	..	5.0	10
		5.4	1
		6.1	5
Canned	..	3.8	5
Dried	..	12.1	5
Stewed	..	4.1	5
Peanuts	3.9	..	10
	11.6	..	5
	16.4	..	1
Peanut butter	4.4	..	13
Pears	..	3.3	1
		3.6	9
Eating	..	3.4	5
Cooking	..	2.2	5
Stewed	..	1.5	5
Canned	..	2.6	5
Peas, fresh	..	1.3	9
	2.3	..	1
		5.2	12
		1.2	5
Boiled	1.4	..	5
Canned	2.9	..	5
		1.3	13
Dried	..	5.0	9
		7.1	10
		10.3	5
Boiled	..	1.2	5
Split, dried	..	7.7	5
Boiled	0.5	..	5
Yellow	3.4	..	1
Pepper (condiment)	..	28.9	5
Perch	6.3	..	2
Pheasant, roast	21.6	..	5
Pies:			
Apple	..	1.6	13
	0.3	..	5
Cream	1.4	..	13
Custard	2.1	..	5
Gooseberry	..	0.4	5
Mince	..	1.2	5
Rhubarb	..	4.8	5
Pigeon, boiled	25.7	..	5
Roast	29.1	..	5
Pig's blood	..	4.9	12
Pike	11.8	..	10
	2.8	..	1
Sea, fresh	19.5	..	12
Pineapple, fresh	..	6.8	13
		3.6	1
		7.0	5
Canned	..	2.2	5
Plaice, fried	21.4	..	5
Steamed	18.4	..	5
Plums*	..	4.8	5
Pollack, fried	9.9	..	5
Steamed	12.4	..	5
Pomegranate juice	..	3.5	5
Poppy seeds	..	31.5	1

* Ash alkaline *in vitro*, partly acid *in vivo*.

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
s, lean	10.0	..	13
d	7.7–18 7	..	5
	11.9	..	10
ast	28 6	..	5
oast	14.6–17 0	..	5
alt, smoked, lean, cooked	27.4	..	5
at	8.3	..	13
	12.5	..	1
	9.9	..	1
	6.4	..	13
	2.5	..	5
d	3.6	..	5
	..	2.1	1
stics	2.9	..	5
, sweet, raw	..	6.7	9
ed	..	7.9	13
ed	..	5.0	5
	..	7.0	9
		7.3	12
d)	..	10.3	5
ked	..	10.0	13
		12.4	5
led, new	..	7.2	5
Old	..	5.3	5
ips	..	18.0	13
		19.6	5
eamed	..	4.5	13
ied	..	7.2	13
ashed	..	6.0	13
		5.1	5
oast	..	12.8	5
lad	..	6.0	13
starch	..	0.3	1
pear	..	6.7	14
s*	..	20.3	5
ved	..	7.8	5
ngs:			
e	..	1.7	5
o	..	2.8	5
olina	..	1.7	5
ioca	..	2.4	5
Rice	9.0	..	13
Wheat	11.0	..	13
kin	..	7.8	5
		1.5	9
		0.3	1
Oats	17.6	..	1
juice	..	3.7	14
es	..	4.9	5
t	14.8	..	10
	22.4	..	1
ved	20.1	..	5
ies, ved	..	2.9	10
		6.1	1
		7.2	5
te	..	3.1	1
s	..	23.7	10
		27.0	5
erries	..	5.3	1
		6.1	5
ved	..	4.1	5

sh alkaline *in vitro*, partly acid *in vivo*.

TABLE 67.—**The Metabolic Reaction of Foods.**—*Continued.*

Food items.	Degrees of acidity.	Degrees of alkalinity	[illegible]
Raspberry juice	..	4.9	[illegible]
		0.5	1
Rhubarb, fresh	..	8.6	13
		8.9	[illegible]
		13.0	5
Stewed	..	9.1	5
Rice, white	9.0	..	9
	8.1	..	10
	7.6	..	5
	5.7	..	12
Boiled	2.6	..	5
	2.5	..	13
Rice pudding	..	1.7	5
With raisins	1.5	..	13
Rice starch	3.2	..	1
Romaine	..	7.0	1
Rusk	..	5.9	5
Rutabagas	..	8.5	9
Rye	11.3	..	1
Ryvita	2.5	..	5
Sago	1.3	..	5
Salad dressing, boiled	1.9	..	13
Salmon, fresh	11.0	..	13
	8.3	..	1
Steamed	16.2	..	5
Canned	20.1	..	5
	10.8	..	13
Salsify, boiled	..	2.9	5
Sapodilla, Cuban	..	4.8	14
Sardines	11.4	..	13
Canned	26.5	..	5
Sauerkraut	..	5.7	13
Sausage, beef, fried	12.9	..	5
Black	4.4	..	5
Breakfast	2.0	..	5
Pork, raw	2.5	..	5
	6.4	..	13
Fried	3.6	..	5
Scallops, steamed	36.2	..	5
Scones (with egg)	2.6	..	5
(Without egg)	..	0.4	5
Sea-kale, boiled	1.0	..	5
Semolina	6.7	..	5
Shellfish	19.5	..	1
Shepherd's pie	1.4	..	5
Shortbread	4.6	..	5
Shredded Wheat	12.2	..	13
	5.7	..	5
Shrimps, cooked	1.6	..	5
Smelts	12.0	..	11
Fried	..	3.9	5
Sole	16.9	..	5
Fried	15.5	..	5
Sorghum	0.8	..	1
Soups:			
Cream of pea	..	0.9	13
Tomato	..	2.7	13
Potato	0.1	..	5
Vegetable	..	0.7	13
Soursop, Cuban	..	6.3	14
Soy bean, said to be highly alkaline.			
Soy sprouts	..	16.4	14

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
	9.6	..	13
	2.1	..	13
	..	27.0	8
		13.1	12
		5.1	1
		11.9-21.8	3
	..	39.6	5
ied	8.5	..	5
d, grilled	16.9	..	5
eens, boiled	..	4.3	5
Hubbard	..	2.8	13
e Beef.			
d kidney pie	14.0	..	5
ries	..	3.5	5
		1.8	1
a, steamed	26.1	..	5
	0.6	..	5
eet	..	9.4	1
ara	..	3.3	5
brown (Barbados)	..	60.0	12
d white	..	< 0.1	5
cabbage, *see* Hung-toi.			
raw	..	4.9	5
d	..	2.6	5
eads, stewed	11.7	..	5
English golden	..	14.2	5
ines	..	11.8	1
		5.3	5
a	1.2	..	5
e	..	2.2	13
m	..	0.5	13
	..	15.0	14
ry leaves	..	53.5	1
an	..	46.5	5
sion	..	—	5
white	1.8	..	5
ole wheat	7.0	..	5
, home-made	..	5.2	5
to	..	5.6	5
		5.6	9
		13.7	12
d	..	6.8	5
e, ox	10.6	..	1
ickled	23.6	..	5
ep, stewed	18.7	..	5
e, black	..	49.4	5
stewed	8.1	..	5
	8.9	..	13
med	15.2	..	5
sea, steamed	22.1	..	5
non	8.8	..	2
s, white	5.9	..	1
k	10.3	..	1
t, steamed	18.4	..	5
y, dark meat, raw	10.4	..	13
Cooked	19.3	..	13
t meat, raw	12.7	..	13
Cooked	17.1	..	13
y, roast	19.5	..	5
s	..	2.7	10
		10.2	1
		6.5	5
ed	..	5.2	5
tops, boiled	..	2.3	5
-rooted cabbage	..	1.7	1

TABLE 67.—**The Metabolic Reaction of Foods.**—(*Continued*)

Food items.	Degrees of acidity.	Degrees of alkalinity.	[illegible]
Veal	13.5	..	13
	12.4	..	5
Chops, med. fat	9.8	..	14
Cutlet, fried	23.5	..	5
Fillet, raw	16.1	..	5
Roast	28.5	..	5
Loin	9.8	..	2
Med. fat	22.9	..	1
Roast	13.0	..	13
Vegetable marrow	..	1.9	5
Vegex	..	17.1	5
Venison, roast	23.8	..	5
Vinegar	..	1.2	5
Waffles	5.6	..	13
Waldorf salad	..	4.0	13
Watercress	..	5.0	1
		7.5	5
		11.7	14
Walnuts, English	9.2	..	1
	8.4	..	5
	7.9	..	13
Watermelon	..	2.7	9
		1.8	1
Waternuts	0.2	..	1
Welsh rarebit	2.8	..	5
Wheat, entire	12.0	..	9
	9.7	..	10
Wheat groats	10.2	..	1
Starch	8.0	..	1
Whelks, cooked	23.5	..	5
Whey	..	2.7	1
Whitefish	11.3	..	13
White sauce, med.	..	0.9	13
Whiting, fried	15.2	..	5
Steamed	16.4	..	5
Wines, white:			
Moselle and Saar	..	0.73	1
Rhinewine	..	0.27	1
Nahe Valley	..	0.31	1
Franconian	..	1.00	1
Bordeaux	..	1.30	1
Central Italy	..	0.91	1
Spanish	0.48	..	1, 7
Caucasian	..	1.60	1
California	..	1.21	1
Red:			
Rhenish Hesse	..	1.34	1
Rhine Valley	..	1.12	1
Ahr Valley	..	0.29	1
Bordeaux	..	1.43	1
Bohemian	..	0.67	1
Central Italy	..	0.70	1
Spanish	..	0.68	1
Caucasian	..	2.33	1
Algerian	..	2.23	1
California	..	0.19	1
Wines, sweet:			
Tokay	..	1.03	1
Sherry	..	0.51	1
			(Konig)
Malaga	..	3.04	1
Wines, sparkling:			
Sparkling Tokay	..	0.49	1
French Champagne	..	0.96	1

Food items.	Degrees of acidity.	Degrees of alkalinity.	Source of data.
...uit:			
. . . .	..	3.64	1
...eberry, sweet	..	3.42	1
...rtleberry, extra old	..	1.56	1
...e pudding	2.8	..	5
... .	10.4	:	1

SOURCE OF DATA FOR TABLE 67.

...G, R.: Die Nahrungs- und Genussmittel, Dresden, E. Pahl, 1929.
...ERT, I. J., and PORTER, M. T.: Dietetics Simplified, New York, The Macmillan Company, 1937.
...VIDSON, J., and LECLERC, J. A.: A New Method for the Determination of the Acid-base Balance in Food Materials, Jour. Biol. Chem., **108**, 337, 1935.
...HROP, R. E.: The Potential Alkalinity of Honey: Its Acid-base Value as a Food, Jour. Nutr., **11**, 511, 1936.
...CANCE, R. A., and WIDDOWSON, E. M.: The Chemical Composition of Foods, Medical Research Council, Special Report Series, No. 235, London, 1940.
...SUM, W. D., BLATHERWICK, N. R., and SMITH, F. H.: The Use of Basic Diets in the Treatment of Nephritis, Jour. Am. Med. Assn., **81**, 883, 1923.
...HALL, H., and HEISLER, A.: Nahrungsmittel abelle zur Aufstellung und Berechnung von Diätverordnungen, 2d ed., Wür burg, C. Kabitzsch, 1910.
...ERMAN, H. C.: Food Products, New York, Th Macmillan Company, 1928.
——— Chemistry of Food and Nutrition, New York, The Macmillan Company, 1935.
...ERMAN, H. C., and GETTLER, A. O.: The Balance of Acid-forming and Base-forming Elements in Food and Its Relation to Ammonia Production, Jour. Biol. Chem., **11**, 323, 1912.
...ERN, F.: Applied Dietetics, Baltimore, The Williams & Wilkins Company, 1936.
...LLMANN, E. V.: Diet in Sinus Infections and Colds, New York, The Macmillan Company, 1934. Data attributed to R. Berg, Grundlagen einer richtigen Ernährung, Dresden, 1930.
...VALLER, D.: Nutritive Value of Foods, Ann Arbor, George Wahr, 1932. Data attributed to H. C. Sherman, Food Products, 1916 and 1928.
...VINTON, A. L., and WINTON, K. B.: The Structure and Composition of Foods, New York, John Wiley & Sons, vol. **2**, 1935. Chiefly items from Chung and Ripperton, Hawaii Agr. Exp. Sta. Bull. 60, 1929.
...FELLERS, C. R., and SMITH, E. G.: Chemical Composition and Fermentation Studies on Citron, Jour. Agric. Res., **53**, 859, 1936.

MINERALS.

...alcium.—Calcium salts from different food sources are not ...ally well utilized. This may be due in part to retention in ...ulose fiber, but it is primarily dependent upon the presence of ...lic acid. Much plant calcium exists as the insoluble oxalate. ...ere the calcium is bound to protein, as in milk, it is obviously ...e available for absorption. Milk calcium is usually regarded ...wholly assimilable. Judging by biologic experiments, the cal...n of kale is almost as available as that in milk; this is attributed ...he low oxalate content of kale. Spinach, on the other hand, ...ch in oxalates. Investigations by Kohman (1939) indicate that ...nach not only supplies no available calcium but also renders ...vailable a considerable portion of that present in other foods ...sted with the spinach. To provide assimilable calcium in the ... it is necessary to recognize the deleterious effect of oxalic acid. ...le 68, therefore, presents specially assembled data with reference ...hese factors. The following additional items from earlier work ... worth noting:

	Per cent.		Per cent.
Cocoa	0.45–0.49	Dried figs	0.[illegible]
Coffee, roasted	0.01–0.08	Ground pepper	[illegible]
Coffee, beverage	0.002	Poppy seeds	1.[illegible]
Tea, black	0.37–1.43	Sorrel	0.27–[illegible]
Tea, beverage	0.0044		

The possibility of nuts being a source of oxalic acid is apparent from analyses of Majumdar and De (1938): almonds 0.41 per cent, cashew nuts 0.32 per cent.

TABLE 68.—**The Calcium and Oxalate Content of Various Foods.***

Food items.	Calcium, per cent.	Oxalic acid, per cent.	Total solids, per cent.
Apples, early summer	0.010	None	12.58
Apricots	0.024	0.014	13.62
Asparagus	0.0201	0.0052	6.05
Avocados	0.0095	None	14.[illegible]
Bananas	0.0071	0.0064	23.81
Beans, green pod	0.0440	0.0310	9.58
Lima	0.044	0.0043	24.25
Wax	0.054	0.041	7.89
Beets, unpeeled	0.018	0.138	8.23
Beet leaves	0.120	0.916	6.60
Beet stems	0.040	0.338	6.66
Blackberries	0.038	0.018	12.25
Blueberries	0.026	0.015	20.81
Broccoli, leaves and flowers	0.21	0.0054	10.50
Broccoli, stalks	0.092	0.0035	7.57
Cabbage	0.189	0.0077	8.80
Cabbage sprouts	0.150	0.0059	8.52
Cabbage, Chinese	0.210	0.0073	6.45
Cantaloupe	0.0090	None	8.46
Carrots	0.044	0.033	11.02
Cauliflower	0.034	None	8.90
Celery stalks, bleached	0.054	0.034	4.58
Celery, soup leaves	0.55	0.050	14.66
Celery, soup stems	0.18	0.062	10.20
Chard, Swiss, leaves	0.11	0.66	9.47
Chard, Swiss, stalks	0.045	0.29	7.10
Chard, Swiss, leaves and stalks	0.129	0.645	8.28
Chenopodium	0.099	1.11	8.20
Cherries, red sour	0.010	0.0011	12.18
Sweet, Bing	0.0019	None	24.50
Collards	0.361	0.0091	12.75
Corn, sweet, white	0.0076	0.0014	25.00
Yellow	0.0033	0.0052	33.51
Cress, land, wild	0.24	None	15.00
Cress, early, fine, curled	0.182	0.0106	8.80
Cucumbers	0.014	None	3.72
Currants, red	0.030	0.019	15.52
Dandelion greens	0.171	0.0246	11.38
Dewberries	0.027	0.014	13.70
Eggplant	0.010	0.0069	6.18
Endive	0.105	0.0273	7.58
Escarole	0.087	0.0116	6.10
Gooseberries, green	0.023	0.088	13.05
Grapes, Concord	0.024	0.025	15.30
Grapes, Thompson's seedless	0.013	None	23.90
Grape fruit	0.015	None	11.50

* Kohman, E. F.: Jour. Nutr., **18**, 233, 1939.

Food items.	Calcium, per cent.	Oxalic acid, per cent.	Total solids per cent
	0.31	0.013	11.05
us leaf ribs	0.294	0.011	18.05
arters	0.099	1.11	8.20
ice	0.011	None	9.20
	0.17	0.083	18.90
	0.073	0.0071	6.46
e	0.015	None	10.39
	0.26	0.11	31.00
	0.015	None	15.35
Casaba	0.0054	None	11.22
dew	0.0090	None	6.08
greens	0.235	0.0077	8.40
s	0.0084	None	14.45
	0.077	0.048	13.20
green	0.057	0.023	13.65
	0.038	0.024	15.15
eel	0.15	0.078	22.90
	0.29	0.19	13.70
	0.049	0.010	22.70
, Alberta	0.012	0.0050	15.68
	0.0089	None	14.10
Bartlett	0.014	0.0030	17.60
	0.019	None	19.50
, sweet, green	0.0135	0.016	7.34
le, Hawaiian, canned	0.019	0.0063	17.44
damson	0.015	0.010	11.70
gage	0.0080	None	13.20
	0.052	0.476	7.74
s, Irish	0.0094	0.0057	20.38
t	0.034	0.056	33.60
, Italian	0.12	0.0058	15.76
ne, leaves	0.13	0.910	9.45
ks	0.067	0.518	8.44
es	0.028	None	3.75
	0.11	0.0015	10.82
erries, black	0.058	0.053	22.10
	0.023	0.015	14.10
rb	0.044	0.50	6.62
h	0.122	0.892	10.35
h, canned	0.058	0.364	7.15
h, New Zealand, leaves	0.11	0.89	7.60
h, New Zealand, stalks	0.083	0.65	8.26
n, green, summer	0.036	None	5.51
berries	0.031	0.019	10.48
oes	0.010	0.0075	5.76
s, peeled	0.037	None	8.16
eeled	0.028	0.0018	6.58
greens	0.245	0.0146	8.25
melon	0.0060	None	10.42

osphorus.—Certain phosphorus compounds are less available others. A variable amount (20 to 60 per cent) of ingested ns (calcium-magnesium salts of inositolhexaphosphoric acid) xcreted unchanged. The fate of the remainder is obscure. e average, 97.5 per cent of the phosphorus of animal origin is able. Where cereals bulk large in the dietary, the total phoss content is a wholly incorrect guide as to the available phoss intake. According to the authorities responsible for the ded data, Table 69, phytin constitutes less than 5 per cent of tal phosphorus of an average middle-class English diet.

Table 69.—**Phytin Content* of Various Foods.†**

Food items.	*Total P, mg. per 100 grams.*	*Phytin P, mg. per 100 grams.*	*Phytin P as percentage of Total P*
Cereals			
Barley, pearled	354	78	22.0
Barley, whole (incl. husk)	335	211	63.0
Bread, brown	198	82	41.5
Hovis	211	90	42.5
Swedish hard	360	90	25.0
Turog	127	35	27.6
White	59	3	5.1
Wholemeal	237	87	36.5
Corn, see Maize.			
Digestive biscuits	134	40	30.0
Flour, white	102	15	14.7
Flour, wholemeal	355	166	46.8
Grapenuts	255	86	33.7
Maize, yellow	363	210	58.0
Millet, whole	350	191	55.5
Oatmeal, Scotch	380	160	42.0
Oats, whole (incl. husk)	350	182	52.0
Poast Toasties	50	8	16.0
Rice, polished	99	41	41.5
Rice, unpolished	350	240	68.5
Rolled oats	339	224	66.0
Rusks	81	9	11.0
Ryvita	336	100	29.7
Sago	38	19	50.0
Shredded Wheat	173	79	45.3
Tapioca	42	0	0
Vitawheat	340	140	41.2
Wheat, whole	361	168	46.4
Cocoa and Chocolate			
Cocoa	675	162	24.0
Chocolate, milk	215	38	17.6
Chocolate, plain	139	82	58.5
Fruit			
Apples	8.5	0	0
Bananas	28.1	0	0
Blackberries	25.9	4.2	16.2
Figs, dried*	91.5	11.9	13.0
Prunes*	83.0	0	0
Legumes			
Beans, baked, canned	184	27	14.6
Beans, broad, boiled	108	5.4	5.0
Beans, butter, raw*	318	147	46.3

* Results expressed on fresh weight basis of edible portion only; "dried" foods reported on purchased weight basis.

† McCance, R. A., and Widdowson, E. M.: Biochem. J., **29**, 2697, 1935.

...d items.	Total P, mg. per 100 grams.	Phytin P, mg. per 100 grams.	Phytin P as percentage of Total P.
...t, raw* (p. 768)	309	154	50.0
...	243	93	38.3
...ilue	303	150	49.5
...canned	168	29	17.0
...resh	105	11	10.8
...plit	268	124	46.3
...36 values)			
...ds (shelled)	442	364	80.1
...ona nuts (shelled)	299	250	83.6
... (shelled)	592	510	86.1
...nuts (shelled)	74	9	12.2
...nut (shelled)	94	75	80.0
...ts (hazelnuts)	229	170	74.2
...uts	365	220	60.2
...uts	510	212	41.5
...bles			
...ts	20.0	3.3	15.8
...iflower	35.7	0	0
...ry	31.7	0	0
...salem artichokes	37.0	9.2	25.0
...hrooms	136.5	0	0
...ns	30.0	0	0
...toes, new, boiled	35.7	8.2	23.0
...atoes, old, boiled	31.0	6.0	19.3
...ach	98.0	0	0
...des	19.0	0	0
...nips	27.5	0	0

TABLE 70.—**Available or Ionizable Iron.**†

Food items.	Total iron, mg. per cent.	Ionizable iron, mg. per cent.
...s	4.23	4.19
...eating	0.29	0.26
...ng	0.29	0.29
...s, fresh	0.37	0.35
...	4.09	4.01
...kes, globe, boiled	0.49	0.49
...ps	0.53	0.53
...raw	1.00	0.29
...	0.41	0.41
...baked, canned	2.05	2.01
...r, boiled	1.67	1.19
...ot, boiled	2.50	2.10
...er, boiled	0.59	0.44
...w	3.70	0.37
..., lean	5.00	0.95
...	0.05	0.05
...oiled	0.70	0.66
...rries	0.85	0.34
...uts	2.82	1.75
...white	1.00	0.89
...e wheat	2.70	2.13

...se data are calculated from McCance and Widdowson (1940) and do not ...ily agree with the values shown in Table 71 or elsewhere in this book. (see ...5)

TABLE 70.—**Available or Ionizable Iron.**—*Continued*

Food items.	Total iron, mg. per cent.	[illegible]
Brussels sprouts, boiled	0.63	[illegible]
Cabbage, boiled	0.47	[illegible]
Raw, 72% available.		
Carrageen moss, dried	8.88	[illegible]
Carrots, boiled	0.37	[illegible]
Raw	0.56	[illegible]
Cauliflower, boiled	0.48	[illegible]
Celeriac, boiled	0.84	[illegible]
Celery	0.61	[illegible]
Cherries	0.38	[illegible]
Chestnuts, baked, 51% available.		
Chicken, roast	2.60	0.71
Chicory	0.69	0.4[illegible]
Chocolate, dark	3.28	2.[illegible]
Milk	1.67	1.4[illegible]
Cocoa powder	14.30	13.[illegible]
Cocoanut	2.08	1.79
Milk	0.10	0.[illegible]
Cod, steamed	0.50	0.[illegible]
Cranberries	1.11	0.78
Cucumber	0.30	0.30
Currants, black	1.27	1.27
Red	1.22	1.0[illegible]
Dried	1.82	1.62
Custard apple	0.53	0.53
Damson plums	0.41	0.29
Dates	1.61	1.32
Eggplant, raw	0.39	0.20
Eggs	2.53	2.53
Endive	2.77	1.99
Figs, fresh	0.42	0.40
Dried	4.17	4.00
Flour, white	0.92	0.86
Gooseberries	0.32	0.13
Grapefruit	0.26	0.24
Grapes, black	0.34	0.28
White	0.34	0.29
Greengage plums	0.37	0.31
Haddock, steamed	0.70	0.70
Ham, cooked, lean	2.60	0.39
Hazelnuts	1.06	1.04
Heart, baked	8.10	5.10
Herring	1.50	1.50
Fried	1.90	1.41
Herring roe, fried	1.50	1.48
Horseradish	2.03	2.03
Kidney, pig, fried, 58% available.		
Ox, stewed	7.10	4.69
Leeks, boiled	2.00	1.82
Lemon juice	0.14	0.11
Lentils, raw	7.62	5.03
Lettuce	0.73	0.46
Liver, calves', raw	13.90	13.90
Pig's, raw, 80% available.		
Lamb's, fried, 100% available.		
Ox, fried	20.70	18.42
Loganberries	1.37	1.04
Mackerel, fried	1.20	0.77
Mushrooms	1.03	1.02
Mustard and cress	4.54	1.91
Mutton, roast	4.30	1.03
Nectarines	0.46	0.40
Oatmeal	4.12	3.96
Olives, bottled, brined	1.03	1.00
Onions	0.30	0.30
Orange juice	0.30	0.25

Food items.	Total iron, mg. per cent.	Ionizable iron, mg. per cent.
boiled	0.45	0.45
uit	1.12	1.12
fresh	0.38	0.38
	6.75	6.21
	2.04	2.04
ing	0.22	0.22
g	0.16	0.15
sh, raw	1.88	1 39
	1.87	1.87
boiled	1.44	1.22
oiled	1.74	1.24
e	0.42	0.38
teamed	0.60	0.58
	0.30	0.16
nate juice	0.15	0.04
ops, fried	2.40	1.13
s, boiled	0.48	0.47
boiled, 81% available.		
dried	2.90	2.09
	0.32	0.17
stewed	1.90	0.80
s	1.88	1.17
, dried	1.55	1.49
rries	1.21	0.92
	3.73	3.73
b	0.40	0.40
	0.45	0.38
, canned	1.30	1.20
, boiled	1.23	1.21
es, canned	4.00	2.60
ge, beef, fried	4.10	2.95
, fried	3.30	2.70
le, boiled	0.60	0.55
fried	1.20	1.20
teamed	0.70	0.70
ch, boiled	4.00	2.30
berries	0.71	0.37
nas, dried	1.82	1.18
s, raw	0.35	0.34
breads, steamed	1.60	1.14
, English golden	1.45	1.38
rine juice	0.27	0.26
toes	0.43	0.28
e, cooked	3.40	0.65
le, black	9.17	9.17
ps, raw	0.37	0.25
raw	2.30	0.92
st	2.50	1.37
able marrow, boiled	0.22	0.19
ts	2.35	0.96
cress	1.62	1.07
es, boiled	15.00	8 70

MINERAL DATA ON VARIOUS FOODS.

roduction.—In compiling data on the mineral content of foods, rse was had to the literature (elsewhere designated) and to blished analyses. Where available, averaged findings of differ- nvestigators in various sections of the country were taken as more nearly representative than any single estimation. Where reported analyses differed appreciably, an average was par- rly desirable. On the other hand, any figure that diverged edly from the results of other analysts was discarded. For ple, the iron content of Malaga grapes is given by Toscani

and Reznikoff as 0.54 to 0.71, by Peterson and Elvehjem as 2.2, by Sherman as 0.73, and by Rose as 0.30 mg. per 100 grams of fresh fruit. Our approximation is 0.68 mg

Much of the literature gives mineral data to the third decimal place in milligrams. It was felt that it was unnecessary to report these analyses closer than to the nearest second decimal. This has reduced many of the manganese figures, especially as far as meat and fish are concerned, to identity where in reality slight divergence was encountered.

For the most part similar or identical laboratory procedures were employed in ascertaining any one element. This eliminates to a large extent variations in results attributable to method rather than to fact. It should not be forgotten, however, that method is an important factor affecting the results obtained and that no uniformity is claimed for any part of the data compiled in this table.

From the laboratory standpoint, it is preferable to remove moisture and to make all analyses on the desiccated basis. From the standpoint of the user of foods, reports on the dry basis are confusing and difficult to evaluate. To the best of our knowledge the figures reported in this table are on the wet basis, that is, on the food as it occurs naturally. Since moisture content may vary widely in samples of food otherwise identical, and since the percentage value will shift accordingly, the clinician should take the figures given as approximations. In determining the need of the patient, the quantity of the food eaten must be considered as well as its probable mineral composition. Parsley is outstanding for its high iron concentration, yet in terms of actual consumption, it usually is negligible as a source of iron. On the other hand, whole wheat bread, although not an iron-rich food, may be consumed in sufficient amounts to provide a significant portion of the daily requirement of the normal adult (Myers, *et al.*, 1935).

No factor affects the mineral composition of food more adversely or more strikingly than does cooking. Since our diet is composed to a large extent of cooked foods, analysis of such would seem the only logical procedure. Methods of cooking, however, differ so vastly as to discourage the analyst from attempting this extra process. In many cases no data are available as to the state of the food analyzed. Except where specified, analyses are best taken as involving the raw food. Many figures reported in the literature as on cooked food have been omitted because it had been stated or was apparent that the data had been obtained by "calculation." It is possible that some of the figures we have included for meat have been arrived at by general considerations plus a little mathematics; it has not always been possible to ascertain from the literature just how much actual analytical work has been done.

Many factors influence the mineral constituents of plant and animal foods during the period of their elaboration by Nature. It is not known to what extent these minerals are accidental rather than essential. As far as we know, the chief agents determining their presence are composition of soil and availability of moisture.

utritionist is specifically warned against using these analyses r computation of mineral intake in investigating the cal-l phosphorus balance of patients. In such cases both food eta must be analyzed or interpretation of findings is futile. le should be used only as an aid in selecting diets high or n respect to certain minerals. As shown by Davidson and (1936) appreciable variation is encountered in the mineral of some vegetables grown under different conditions. Each tly has a range of variation such that single values may be ing. The inadequacy of analytical data is obvious.

rule, analyses have been made upon foods grown naturally. odern market contains much which is hot-house grown or ise forced. Not only may the total quantity of minerals s maturation proceeds but its character may be altered. ure corn, for instance, contains ten times as much inorganic orus as the ripe cereal, the change to the organic form ing the production of the none-too-available phytic acid.

osure to metallic containers not infrequently augments the l content of minerals, particularly with respect to copper on. The iron content of Norwegian goat cheese (11 to 27 mg. r 100 grams) is ascribed to long cooking in iron pans, the ele-apparently being bound as a complex salt to lactic and citric in sour milk. Milk transported in cans contains more iron milk taken directly from the cow. Canned corn has frequently reported as having an unusually high copper content.

ta on the sulfur content of foods is provided in Table 73. ugh the magnesium, sodium and potassium contents of the common foodstuffs have been determined, little use is made ally of such information.

n.—The ingested iron is no criterion as to that assimilated. nearer the iron comes to duplicating the type of organic linkage l in hemoglobin, the less available it appears to be for synthesis ew hemoglobin. Inorganic iron salts seem to provide the ent in its most utilizable form. Acceptance of the theory that inorganic iron is assimilable by the human being is rendered ous by the complexity of the factors involved.

pper.—Minute amounts of copper have a stimulating effect on th, respiration and hematopoiesis (Steenbock, Elvehjem, *et al.*, . This element markedly accelerates the spontaneous oxida-of iron *in vitro*. The oxidation of glutathione is catalyzed by er, not by iron (Voegtlin, *et al.*, 1931).

e respiratory pigment, hemoglobin, is replaced in the blood phalopods (*e. g.*, octopus and squid), crustacea (*e. g.*, lobsters rabs), and mollusks (*e. g.*, oysters and clams) by hemocyanin n contains copper instead of iron, the copper concentration ng from 0.33 to 0.38 per cent.

hough the daily intake of copper is only 2 to 2.5 mg., it is a ry essential. The copper of egg-yolk is not available to the

body because of the easily-split sulfur compounds present copper sulfide is not absorbed (Sherman, Elvehjem, Hart, 1934). Bread is a fair source of copper although poor in iron.

Manganese.—Extremely small amounts of manganese occur in the diet. Its function is obscure, although it appears to be necessary for avoidance of sterility in the male and for production of an adequate supply of milk in the female rat. Manganese may also play an important rôle as a catalytic agent in blood regeneration.

Chlorides.—It is customary to report chloride analyses in terms of NaCl. Since the chlorine may be combined with sodium, potassium, calcium, magnesium, and other elements occurring in traces, this may lead to absurdities. For example, molasses is very high in potassium (1.349 per cent) and low in sodium (0.019 per cent) yet its chlorine content (0.317 per cent) includes it among foods high in "NaCl." As a rule, when a diet low in sodium chloride is indicated, it is the sodium, not the chlorine which is proscribed. In most instances, of course, the restriction is confined to the use of table salt either as employed in cooking or in dining. When, however, it becomes necessary to limit the amount of naturally occurring sodium chloride, it should be remembered that the data given in the last column of Table 71 may or may not present the desired information.

Calcium and Phosphorus.—The importance of these elements in the diet is indicated by the current efforts to increase their intake (and likewise that of iron) by fortifying staple foods. In general, Table 71 contains data on the natural concentrations. Where high values are listed, it may be inferred that fortification thereof is the rule.

TABLE 71. **Mineral Constituents of Various Foods.**

(Estimated in milligrams per 100 grams of moist weight.)

A

tems.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
. . .	400	126	4.90				
raught . .	12	15	0.05	0.13		36	59
ottled . .	13	18	0.08	0.07		36	59
raught . .	11	22	0.05	0.08		35	58
ottled . .	14	18	0.07	0.06		32	53
. . . . .	17	29	0.10	0.11		54	89
waiian:							
ele . . .	170	34					
oa . . .	584	16					
Kellogg . .	77	1,336	16.67	1.00			
. .	230	457†	4.07	1.21	1.94	37	61
cheese . .	930	701	1.30	0.05	0.11	880	1,452
ter . .	11		10.00	0.07	0.08	25	42
ter, Heinz .	18	12	2.20	0.64			
gets (dried) .	24	42	4.10				
nned . .			0.58				
ried	32	48	1.50			61	100
esh	8	12	0.38	0.10	0.04	5	8
ice	6	1	0.34				
canned . .	10	20	0.65	0.34	0.08		
dried . . .	65	120	6.74	0.37	0.28	9	15
dried, cooked	18	32	2.01	0.11			
fresh . . .	13	24	0.30	0.14		2	3
d, fresh corm	16	207	4.90				
t	7	27	1.95	0.22		7	11
es, French .	40	94	1.89	0.31	0.36		
es, French,							
. . . .	44	40	0.49	0.09		84	139
es, Jerusalem,							
. . . . . .	30	33	0.41	0.12		58	96
us, fresh . .	25	39	0.79	0.14	0.10	39	64
us, boiled . .	26	85	0.89	0.20		31	51
us, canned . .	21	32	0.75				
us tips, canned	2	38	1.44	0.15	0.13		
(alligator pear)	45	44	6.30				
, Calavo strain	37	49	1.50				
, West Indian .	15	31	0.53	0.21		6	10

B

	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
lston . . .	600	600	24.00	0.30			
canned . .	14	38	0.90				
crisp, drained .	12	216	3.00	0.52	0.02	4,500	7,410
raw	10	96	1.50		0.01	38	63
eans, Heinz:							
n Style . .	81	94	1.10	0.32			
ey	32	63	1.70	0.35			
and tomato sauce	69	46	1.10	0.24			
arian . . .	63	42	1.70	0.30			
shoots . .	5	44	0.70				
.	8	30	0.60	0.21	0.82	125	206
entire .	51	400	4.75	0.37	1.59		
pearled	10	206	0.67	0.12		105	173
pearled, boiled	3	70	0.23	0.04		36	59
			0.42	0.21	0.03		
eamed	47	220	0.70			85	140

ionizable iron, refer to page 769. † See page 769.

now customary to restore, fortify or otherwise augment mineral values of products. Consult label on food.

(Estimated in milligrams per 100 grams of moist weight.)
(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	[illegible]	[illegible]
Bean soup, navy, dehydrated	148	463	10.30				
Beans:							
Baked, canned	62	184	2.05	0.24		[illegible]	[illegible]
Broad, cooked	21	99	0.98	0.43		[illegible]	
Butter, cooked	19	87	1.67	0.16		2	
French, boiled	39	15	0.59	0.10		[illegible]	
Haricot, cooked	65	122	2.50	0.14		[illegible]	
Kidney, dried	132	475	7.00	0.65	1.64	[illegible]	
Kidney, canned	39	142	1.50				
Lima, fresh	28	133	2.20			9	
Lima, canned	16	76	2.16				
Lima, dried	71	347	7.00	0.86	1.07	26	
Navy, cooked	50	200	2.05				
Navy, dried	158	483	8.25	0.69	2.54	32	
Scarlet runner, cooked	26	11	0.59	0.03		9	
Soy, green, cooked	97	273	2.10				
String or snap	50	51	0.95	0.10	0.24	24	
Beef:							
Bone-marrow			0.90				
Brain	8	380	2.30				
Corned	16	291	4.10			2,080	3,[illegible]
Dried	17	323	6.20				
Dripping	1	13	0.20			2	
Heart	9	172	4.80				
Juice	8	31	44.40				
Kidney	7	252	5.50	0.11			
Liver	12	220	8.30	2.15	0.25		
Loin, med. fat	10	182	3.70	0.12			
Muscle, not trimmed	12	222					
Muscle, well trimmed	14	220					
Pancreas			6.00				
Round, lean	13	204	4.10	0.08	0.02	76	[illegible]
Tongue	8	199					
Beef, cooked:							
Bottom round, braised	5	234	4.40				
Clod, braised	7	169	4.00				
Clod, roasted	6	211	2.60				
Rib, roasted	8	199	2.10				
Sirloin, roast, lean	7	284	5.30	0.19		74	
Sirloin, lean and fat	6	237	4.60	0.17		64	
Steak, med. fat, fried	5	257	6.00			70	
Steak, med. fat, grilled	9	303	5.20			64	
Top clod, roasted	17	147	2.90				
Top round, roasted	12	213	3.80				
Topside, lean, boiled	4	247	8.30			49	
Topside, lean, roast	6	286	4.70			62	
Beef, roasted, canned	18	157				839	1[illegible]
Beef sausage, fried	21	168	4.10	0.17		1,770	3[illegible]
Beef stew	13	160	2.49			1,070	1[illegible]
Beet greens	94	40	3.55	0.09	1.26		
Beet greens, cooked			2.98		0.90		
Beets, root	24	37	2.36	0.19	0.94	58	
Beets, boiled	30	36	0.70	0.14		76	
Beets, strained, Gerber	11	13	1.20				
Beets, strained, Heinz	17	37	1.60	0.19			
Bemax	60	1,166	10.60	1.59			
Blackberries, fresh	17	34	1.00	0.16	0.59	10	
Blanc-mange	117	95	0.17	0.04		93	
Blueberries	25	20	0.41	0.11	4.44	8	
Bluefish	23	235	1.10				

* For ionizable iron, refer to page 769.

It is now customary to restore, fortify or otherwise augment mineral valu[es of] cereal products. Consult label on food.

(Estimated in milligrams per 100 grams of moist weight.)
(*Italicized letters* indicate trade names.)

tems.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
	52	1,300	12.10	0.83		6,880	11,330
	3	60	2.80				
, boiled	16	355	2.00			167	276
ep, boiled	11	339	2.20			177	292
	123	916	9.67	0.77			
at	120	1,215	12.70	1.17	9.11	90	149
	176	592†	3.93	1.39	0.92	61	100
ton brown	129	185	3.00			607	1,002
n	55	102	0.70				
ham	50	218	2.50	0.32	3.16	607	1,002
	24	148	2.30	0.28	1.28	1,025	1,691
, light	22	96	0.80				
ite	31	97	1.00	0.34	0.31	353	582
ite (1940)	80		1.10				
ite, enriched	56	100	1.80				
ite, salt-free	16					116	191
ole wheat	50	250	3.30			381	628
ole wheat, salt-	11					31	51
lt	84	68	0.26			100	165
	122	59	3.30	1.37			
tops, cooked	160	54	1.52	0.10		51	84
sprouts	27	121	2.23	0.10	0.27	40	66
sprouts, cooked	27	45	0.63	0.08		11	18
at flour	10	176	1.20	0.07	2.09	12	20
, fresh root	64	39	3.90				
	15	17	0.20	0.03	0.04	1,212	2,000
salt-free	15					162	267
ilk	105	97	0.25			99	163
uts			6.84	1.17			

C

e, Chinese			0.58	0 06	0.12		
e greens	106	99				68	112
e, red, raw	53	32	0.57	0.09		45	74
e, Savoy, boiled	53	27	0.72	0.07		9	15
e, spring, boiled	30	32	0.45	0.07		6	10
e, white, fresh	45	26	0.50	0.05	0.07	24	40
e. winter, boiled	58	16	0.47	0.04		14	23
ght batter type	62	126	2.0				
(Avocado)	37	49	1.50				
liver	11	205	5.40	4.41	0.34		
upe	17	15	0.51	0.06	0.04	41	68
	122	62					
en moss, dried	845	205	8.88	0.51		1,150	1,894
	46	38	0.60	0 08	0.06	36	59
, new, cooked	29	30	0.43	0.08		28	46
, old. cooked	37	17	0.37	0.08		31	51
ry	1,785	442					
nuts	48	480					
fried	19	228	2.30			150	248
steamed	14	212	0.60			108	178
wer	122	60	1.43	0.14	0.17	50	83
wer, cooked	23	33	0.48	0.06		12	20
	137	176				1,819	2,997
, cooked	47	71	0.84	0.13		23	38
	68	48	0.60	0.01	0.16	156	257
cooked	52	19	0.43	0.11		100	165
abbage			0.58	0.06	0.12		
	220	300	7.60	1.50		40	66

ionizable iron, refer to page 769. † See page 769.

(Estimated in milligrams per 100 grams of moist weight)

(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	Cl
Cereal, Mead's	780	620	30.00	1.30		
Chard	87	40	4.02	0.11	0.80	39
Cheese:						
American, Cheddar	930	701	1.30	0.05	0.11	880
Cottage	82	263	0.11			
Dutch	900	478	0.78	0.05		2,050
English cream	30	44	0.14	0.04		151
Full-cream, California	635	528				1,012
Gorgonzola	540	375	0.50	0.15		1,800
Gruyère	1,080	698	0.26	0.27		825
Parmesan	1,220	772	0.37	0.36		1,110
Pot	100	326				
Stilton	362	304	0.46	0.03		1,720
Swiss	1,086	812	1.20	0.13	0.16	
Cherries, glacé	44	18	2.90	1.28		71
Cherries, Royal Anne, canned	59	17	0.27	0.12	0.78	
Cherries, sweet	19	31	0.50	0.14	0.03	14
Cherry juice	17	18	0.30			3
Chestnuts	34	93†	4.10	0.06	3.67	6
Chicken, boiled	11	270	2.10			62
Chicken, boned, canned	32	218	1.9			
Chicken, dark meat	11	208	1.01	0.41		
Chicken, light meat	11	208	0.70	0.27		
Chicken, lean, no skin	15	270	3.80			
Chicken, roast	15	271	2.60			100
Chicory	18	21	0.69	0.14		25
Chili sauce	16	22	1.50	0.39	0.15	
Chili con carne, without beans, canned	21	152	0.7			
Chipped beef	20	370	5.1			
Chives	48	57	8.40			
Chocolate, bitter	92	455	3.00	2.67	3.05	51
Chocolate, sweetened	80	400	2.20	2.00		
Chocolate, milk	175	215	1.67	0.14		132
Chocolate, plain	26	139	3.28	1.11		9
Chow Chow, Heinz	32	53	2.50	0.18		
Chutney, apple	27	34	1.01	0.10		29
Chutney, tomato	26	37	0.93	0.12		46
Cider	8	9				6
Citron, fresh, unripe	64	20	0.70	0.08		
Citron, candied	41	17	0.32	0.14		
Citron, preserved, com.	86	22	1.24	0.48		
Clams, round, raw	106	116				1,220
Clams, soft, long	123	105				910
Cocoa, dry	120	720	3.00‡	3.34	3.53	51
Cocoanut, fresh	24	74†	2.67	0.70	1.31	120
Cocoanut, shredded	59	155		0.69		239
Cocoanut milk	29	37	0.10	0.04		183
Cocomalt	300	330	17.60			
Cod, fresh	10	187	0.34	0.47	0.01	
Cod, salt, raw	27	287	0.52			
Cod, fried	50	261	1.00	0.10		145
Cod, grilled	31	274	1.00			130
Cod, steamed	15	242	0.50	0.10		120
Cod roe, baked in vinegar	13	402	2.30			173
Cod roe, fried	17	504	1.60			188

* For ionizable iron, refer to page 769. † See page 769.

‡ T. and R. report cocoa, A.P., as having Fe 12.6 milligrams per 100 grams.

It is now customary to restore, fortify or otherwise augment mineral values of cereal products. Consult label on food.

(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

tems.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
ion:							
s	2	2	Trace	Trace			
s	3	3	Trace	Trace			
s	4	4	Trace	Trace			
s	4	5	Trace	Trace			
	202	74	1.68				
t	89	112	1.22				
reen	6	103	0.51	0.08	0.15	14	23
ried	21	376	2.90		0.60		
canned	4		0.70	0.10	0.03		
	29	281	3.64	0.48	0.75		
dry	150	334					
d	55	102	0.70				
es, Kellogg	8	56	2.67	0.17	0.05		
	15	39	1.43	0.13		71	117
p	2	31	0.20				
ef	16	291	4.10				
, degerminated	10	140	1.0				
, whole-grain	18	262	2.7				
l, cooked	5	39	0.20				
l, yellow, raw	16	152	1.30	0.20	0.28	146	241
	18	191			0.03		
iled	29	350	1.30			570	939
t (Atlantic), d	133	38	2.00	1.30			
, Graham	20	203	1.88			530	873
, soda	20	100	1.50				
ries	12	10	0.45	0.09	0.30	9	15
	63	120		0.80	0.10	287	473
	99	77	0.22	0.15		80	132
f Wheat, cooked			0.83	0.28	0.44		
of Wheat, "new ute"	504	590	42.40				
ber	16	26	0.35	0.06	0.15	30	50
t juice	16	13					
ts, fresh	26	38	0.70			6	10
ts, black	60	43	1.27	0.14		15	25
ts, black, stewed	42	30	0.89	0.10		10	16
ts, red	36	30	1.22	0.12		14	23
ts, red, stewed	26	21	0.89	0.90		10	16
ts, white	22	28	0.93	0.14		11	18
ts, dried	82	195	4.74	1.12	0.31	60	99
l apple	12	51	0.53	0.15		40	66
meat	33	101	4.70			436	718
powder	637	270	75.00	1.04		470	775
l, egg, baked	127	130	0.51	0.05		123	203
l, egg, boiled	113	116	0.46	0.04		110	181
l powder	122	98	0.15	0.04		110	181
sh	32	48	2.90	0.40	0.17	410	676

D

ns	24	16	0.41	0.08		<1	
ns, stewed	16	11	0.28	0.06			
ion greens	63	45	6.04	0.15	0.34	99	163
ns, corms	13	32	1.50				
idding, *Heinz*	64	78	0.50	0.19			
	71	49	5.07	0.38	0.15	228	376

r ionizable iron, refer to page 769. † See page 769

(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	[illegible]	[illegible]
Dextri-Maltose with Vitamin B, Mead's			8.40	2.00			
Doughnuts	21	55	1.62	0.11		[illegible]	[illegible]
Duck	10	240	1.71	0.41	0.03		[illegible]
Duck, roast	19	231	5.80			[illegible]	[illegible]
Dumpling	6	31	0.32	0.03		[illegible]	[illegible]

E

Food items.	Ca	P	Fe*	Cu	Mn	[illegible]	[illegible]
Eel			0.51	0.17	0.03		
Eel, stewed	42	137	1.20			30	[illegible]
Egg, whole	68	224	2.52	0.23	0.03	106	[illegible]
Egg-white	15	14	0.10	0.03		155	[illegible]
Egg-yolk	130	592	7.60	0.40	0.11	94	[illegible]
Eggs, fried	64	256	2.53	0.05		199	[illegible]
Eggs, poached	52	239	2.30	0.03		155	[illegible]
Eggs, raw or boiled	56	218	2.53	0.03		159	[illegible]
Eggs, scrambled	62	191	2.08	0.05		1,910	[illegible]
Eggs, omelette	39	143	1.63	0.04		1,520	[illegible]
Eggs, cheese omelette	316	356	2.20	0.06		2,180	[illegible]
Eggplant	11	23	0.61	0.10	0.11	24	[illegible]
Embo	42	1,084	7.00				
Endive	104	38	1.23	0.09	0.22	167	276
Escarole	27	29	1.53				

F

Food items.	Ca	P	Fe*	Cu	Mn	[illegible]	[illegible]
Farina, raw	21	125	0.90	0.29	0.45	76	125
Fig pudding, Heinz	97	76	1.10	0.16			
Figs, dried	162	116	3.96	0.35	0.35	43	71
Figs, fresh	53	36	0.79	0.06		14	23
Filberts, hazel nuts	287	354†	4.50	1.35	4.17	67	111
Finnan haddie	19	195	0.90				
Fish paste	146	210	6.00	0.06		2,380	3,920
Fish, white, fried, av.		235	1.10			179	295
Fish, white, steamed, av.		232	0.65			111	183
Flounder, fried	75	218	1.10			200	330
Flounder, steamed	55	296	1.30			148	244
Flounder, "sole"	36	163	0.75	0.18	0.02		
Flours:							
Buckwheat	10	176	1.20	0.70	2.09	12	20
Graham	35	306	3.70	0.49	4.28	70	116
Rye	18	289	2.60	0.42	1.94	55	90
White	16	106	1.30	0.17	0.40	74	122
Whole wheat	31	238	5.00			70	116
Force	66	339	3.98	0.36		1,120	1,845
Frankfort sausage	11	216	2.50				
Fruit salad, canned	8	10	3.45	0.03		3	5

G

Food items.	Ca	P	Fe*	Cu	Mn	[illegible]	[illegible]
Gelatin, Knox sparkling	453	234					
Ginger, ground	97	136	17.20	0.45		40	66
Gingerbread	36	81	1.26	0.07		104	171
Goose	9	176	2.02	0.33	0.05		
Goose, roast	10	267	4.60			159	[illegible]
Gooseberries	35	31	0.47	0.08	0.04		

* For ionizable iron, refer to page 769. † See page 769

It is now customary to restore, fortify or otherwise augment mineral values of cereal products. Vonsult label on food.

(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

…items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
…s, green	28	34	0.32	0.13		7	11
…es, ripe	19	19	0.58	0.15		11	18
…ur	35	306	3.70	0.49	4.28	70	116
			1.00				
…e, Concord	11	11	0.30	0.02		2	3
…e, Welch's	9	9				2	3
…merican types	19	35	0.30	0.06	0.09	5	8
…ack	4	16	0.34	0.08		<1	
…abella	12	23	0.33				
…sabella, with- …s	8	16	0.23				
…alian	15	8	0.43			4	6
…hite	19	22	0.34	0.10		<1	
…t	21	20	0.27	0.03	0.01	5	8
…t, canned			0.70				
…t juice, Florida	27	20	0.18				
…	48	333	5.64	0.19		905	1,490
…eat stock	3	6	0.07				
…es	17	23	0.37	0.08		1	2
…oast	30	338	7.60			134	220
…ommon, whole	10	22	1.46			45	74
…ommon, with- …ds	15	16	0.30				
…ommon, juice	6	6	0.12				
…trawberry, …	34	20	0.28				
…fowl, roast	19	292	9.30			179	295
…	72	62	0.63	0.12	0.62		

H

…items.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
…k			0.48	0.23	0.02		
…k, fillets, raw	32	216	1.00			156	257
…k, fried	114	247	1.20			181	298
…k, steamed	41	178	0.50			59	97
…k, smoked, …ned	58	248	1.00			1,900	3,140
…ried	26	259	0.90	0.17		134	221
…	8	200	0.94	0.23	0.01		
…, steamed	13	255	0.60	0.07		80	132
…oiled	12	218	1.70			3,350	5,520
…resh, lean	14	269	2.10				
…moked, med. fat	11	211	1.40				
…nd eggs, canned	43	166	2.20				
…rger	9	172	2.40				
…oast	28	337	9.80	0.24		108	178
…tewed	21	248	10.80			74	122
…uts, filberts	287	354	4.50	1.35	4.17	67	111
…beef	9	172	4.80				
…sheep, roast	10	389	8.10			125	207
…			0.57	0.28	0.02		
…, baked in vine- …	58	326	1.60			119	196
…, fillets, raw	101	272	1.50			122	200
…, fried	39	339	1.90			125	207
…roe, fried	16	915	1.50			123	203
…y nuts			2.38	1.43			
…y, cooked	2	20	0.10				
…y, raw	60	70	0.54	0.19	0.11	46	76
…	4	19	3.20	0.20	0.03	29	48

…r ionizable iron, refer to page 769.

(Estimated in milligrams per 100 grams of moist weight.)
(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	Cl	
Horseradish	100	80	2.00	0.14		16	[illegible]
Huckleberries	25	20	0.90		4.40	[illegible]	[illegible]
Hung-toi (N. Y. C.)	77	64	3.20				
I							
Ice-cream	150	120	0.17				
Irish stew	10	57	0.90			559	[illegible]
J							
Jam, fruit with edible seeds	24	18	1.47	0.23		9	
Jam, stone fruit	12	18	1.02	0.12		3	
Jelly	14	8	0.30			4	
K							
Kale	197	72	2.54		0.50		
Ketchup, tomato, Heinz	17	42	1.20	1.30			
Kidney beans, canned	39	142	1.50				
Kidney beans, dried	132	475	7.00	0.65	1.64	41	[illegible]
Kidney, ox, raw	14	262	15.00			256	[illegible]
Kidney, ox, stewed	21	392	7.10			144	[illegible]
Kidney, sheep, raw	13	254	11.70	0.31		295	[illegible]
Kidney, sheep, fried	17	433	14.50	0.30		288	[illegible]
Kidney, veal	9	171	4.00				
Kippers, baked	65	426	1.40			1,520	[illegible]
Kix	130	110	5.00				
Kohlrabi	77	44	0.68	0.14	0.11	53	[illegible]
Kumquats			0.51	0.08	0.06		
L							
Lamb chops	11	202	1.60	0.42	0.04		
Lamb muscle	21	180					
Lamb, roast	11	212	1.70				
Lard	1	3	0.10	0.02		4	
Leeks	58	56				24	[illegible]
Leeks, cooked	61	28	2.00	0.09		43	
Lemon juice	24	10	0.15			3	
Lemon peel, Florida			0.75				
Lemons	36	18	0.60	0.04	0.04	2	
Lentils, cooked	32	131	2.60	0.27		13	
Lentils, dry	102	383	8.60			50	
Lettuce, head	43	42	0.56	0.04	†	74	[illegible]
Lettuce, leaf	27	42	1.76	0.06	†		
Lima beans, canned	16	76	2.16				
Lima beans, dried	71	347	7.00	0.86	1.07	26	
Lima beans, fresh	28	133	2.20			9	
Limes	55	36				39	
Litchi	3	32	0.21				
Liver, beef, raw	12	220	8.30	2.15	0.25		
Liver, calves', raw	11	205	5.40	4.41	0.34		
Liver, calves', fried	9	576	21.70			120	[illegible]
Liver, ox, fried	9	550	20.70			82	[illegible]

* For ionizable iron, refer to page 769.

It is now customary to restore, fortify or otherwise augment mineral val[ues of] cereal products. Consult label on food.

(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

ms.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
. . .	20	208	0.44	0.73	0.04		
ed . .	62	283	0.80			525	865
. . .	35	24	1.37	0.14		16	26
. . .	25	86	2.70				
. . . .	15	173					
. . . .	17	173	11.02				
. . . .	13	255	5.19			121	199
. . . .	12	153	3.04			120	198
. . . .	10	160	4.32			112	185
. . . .	191	520				34	56
M							
nd cheese .	199	162	0.35	0.04		1,060	1,746
cooked . .	4	25	0.25	0.26			
n cream sauce, ...	93	45	0.10	0.09			
raw . . .	22	144	1.20			73	120
. . . .	11	273	0.81	0.30	0.02		
fried . . .	28	280	1.20	0.20		114	188
ilk, Horlick's	272	402	1.30	1.22		516	849
lain . . .	59	196	1.10			70	116
with cod-liver	41	137	0.80			70	116
with spleen- and iron .	57	237	280.00			70	116
pple . . .	9	28				140	231
orange, Italian	15	8	0.86			2	3
. . . . .	21	17	0.20			19	31
. . . . .	26	38				82	135
rup . . .	107	13	3.00			10	16
ne	4	12	0.30	0.04		495	816
de	35	12	0.58	0.12		7	11
(*Vegex*) . .	980	2,620	4.60	0.60	Trace	6,760	11,140
vegetable, d	14	13	0.22	0.03		14	23
aise . . .	7	18	0.25				
aise, Heinz .	47	37	0.30	0.44			
Cereal . . .	780	620	30.00	1.30			
paste (chicken, tongue) . .	27	132	3.70	0.09		1,500	2,470
ice, Valentine .	64	255	9.00			1,123	1,850
ptone . . .	25	1,130				561	929
Food . . .	15	227	15.00				
ow's:							
ensed . . .	300	235	0.60			280	462
d	920	710	0.15	0.15			
orated . . .	276	182	0.53	0.07			
lered, skim .	1,180	880	Trace				
lered, whole, Klim	820	620	Trace				
nstituted . .	136	110	0.24				
a	122	96	0.25			110	182
le	120	93	0.24	0.02	Trace	106	175
alo	203	125				62	102
el	143	98				105	173
bao	128	92	0.22				
at	128	103				210	345
nan	20	20	0.15			35	58
re's	83	54				29	48
ep (ewe's) . .	207	123				71	117

* ionizable iron, refer to page 769.

on northern grown lettuce, 1.08; on southern grown, 0.50

(Estimated in milligrams per 100 grams of moist weight)

(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	[illegible]
Millet	14	327				[illegible]
Mince meat	85	175	3.00	0.08		
Mince meat, Heinz	37	35	1.80	0.44		
Molasses	258	30	7.97	1.93	0.04	[illegible]
Mulberries, black	36	48	1.57	0.06		4
Mullet, grey, steamed	14	256	2.00			77
Mullet, red, steamed	29	282	0.90			[illegible]
Mushrooms	14	98	3.14	1.79	0.08	[illegible]
Mushrooms, canned	22	45	5.60			
Mushrooms, fried	4	166	1.25	0.78		103
Mushrooms, dried		371	16.10			
Muskellunge			0.62	0.25	0.02	
Muskmelon	17	15				41
Mussels, boiled	197	331	13.50			315
Mustard	333	177	10.90	0.20		62
Mustard, Heinz			1.80	0.28		
Mustard and cress	66	66	4.54	0.12		89
Mutton chop, lean, raw	13	195	1.70	0.16		84
Mutton chop, lean, fried	15	222	3.10	0.13		134
Mutton chop, lean, grilled	21	239	2.50	0.18		110
Mutton chop, med. fat, raw	13	173	1.00	0.16		70
Mutton chop, med. fat, fried	14	184	2.60	0.12		92
Mutton chop, med. fat, grilled	18	206	2.40	0.18		90
Mutton, leg, boiled	4	238	5.10	0.24		67
Mutton, leg, roast	4	242	4.30			62
Mutton, scrag and neck, stewed	50	220	6.80			82

N

Food items.	Ca	P	Fe*	Cu	Mn	[illegible]
Nectarines	4	24	0.46	0.06		5

O

Food items.	Ca	P	Fe*	Cu	Mn	[illegible]
Oatmeal, cooked	11	65	0.59			
Oatmeal, raw	63	422	3.80	0.50	2.79	69
Okra	72	62	0.63	0.12	0.62	
Olive oil	Trace	Trace	0.08	0.07		Trace
Olives, green, brined	100	15	0.82	0.46	0.05	3,750
Olives, ripe, Heinz	105	14	0.40	0.34		
Olives, stuffed, brined	70	8	0.55	0.57	0.02	3,750
Onions	34	45	0.45	0.08	0.05	21
Onions, spring	135	24	1.24	0.13		36
Onions, boiled	24	16	0.25	0.07		5
Onions, fried	61	59	0.59	0.16		38
Onions, dehydrated	158	256	3.10			
Opihi, Australian limpet	280	170	1.34	0.23		
Orange juice	19	13	0.28	0.08	Trace	3
Oranges	26	20	0.51	0.13	0.03	6
Ovaltine	339	563	3.50	0.65		404
Oxo cubes	101	1,090	14.00	0.32		14,000
Oyster plant			1.24	0.27	0.35	
Oysters	52	155	3.14	3.07	0.21	590

* For ionizable iron, refer to page 769

It is now customary to restore, fortify or otherwise augment mineral values cereal products. Consult label on food.

(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

P

ems.	Ca	P	Fe*	Cu	Mn	Cl	Cl a NaC's
	780	620	30.00	1.30			
	73	93	0.52	0.05		151	249
	19	13	0.25				
			19.21	0.21	0.94		
	59	76	1.07	0.12	0.03	30	50
oked	36	32	0.45	0.10		33	54
oast	46	313	7.70			99	163
t	16	54	1.12	0.12		37	61
t, purple,							
	5	18	0.34				
y, raw	10	49	0.52	0.04		287	473
y, baked	12	60	0.63	0.05		351	578
rt, raw	11	60	0.60	0.05		325	536
rt, baked	14	74	0.74	0.06		399	657
lehydrated	73	397	6.00				
erve	14	15	0.26	0.29			
nned	8	20	0.62	0.10	0.04		
ied	60	120	6.06	0.27	0.67	11	18
esh	10	21	0.36	0.01	0.11	4	6
ter	72	396	1.80				
tter, Heinz	105	76		0.55			
	71	399†	2.31	0.96	1.57	56	92
	9	11					
ned	8	14	0.65				
h	14	17	0.46	0.10	0.06	11	18
l	84	400	5.70	1.40	2.77	35	58
d, cooked	24	113	1.44	0.17		9	15
n	28	127	1.77	0.24	0.41	24	40
n, cooked	13	83	1.22	0.15		8	13
n, canned	26	169	1.87	0.21		318	524
t, cooked	11	122	1.74	0.25		10	16
	89	335	2.58	1.36	3.48	50	83
Flakes, Kellogg	74	550	6.00	0.50			
condiment)	127	130	10.20	1.13		60	99
green	8	23	0.41	0.10	0.14	13	21
llow			0.56	0.37	0.04		
on	22	22				2	3
, roast	49	308	8.40			108	178
			0.68	0.34	0.02		
Heinz:							
			0.80	0.22			
cucumber	24	24	0.60	0.18			
s, sour	20	5	1.00	0.12			
s, sweet	19	5	1.00	0.26			
	17	19					
	9	8	1.20	0.21			
mustard	25	34	1.60	0.23			
sweet, mixed	27	58	3.83	0.76	0.04		
"ham"	9	160	2.20				
boiled	18	352	9.80			75	124
roast	16	404	19.40			99	163
			0.68	0.34	0.02		
ple, canned	12	18	0.80	0.24			
ple, fresh	8	17	0.32	0.07	1.07	51	84
io nuts			7.92	1.17	0.63		
fried	45	251	0.80	0.15		174	287
steamed	38	246	0.60			112	185
pudding, Heinz	65	102					
canned	15	11	2.22	0.16	0.07		

† See page 769.

or ionizable iron, refer to page 769.

(Estimated in milligrams per 100 grams of moist weight.)
(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	[illegible]
Plums, fresh	20	32	0.77	0.15	0.07	2
Plums, Japanese, red, pickled	49		4.20			[illegible]
Poi, commercial†	22	51				
Pollack, fried	128	241	2.80			[illegible]
Pollack, steamed	13	202	0.50			114
Pomegranate	11	105	0.40			3
Pomegranate juice	3	8	0.15	0.07		53
Pork chops, lean	12	219	1.50	0.31	0.06	
Pork chops, loin, grilled, lean	9	211	2.90	0.09		113
Pork chops, loin, grilled, med. fat	8	178	2.40	0.09		72
Pork chops, med. fat	10	179	1.30			
Pork, leg, roast	5	363	1.70			83
Pork, loin, roast, lean	7	206	2.60	0.09		101
Pork, loin, roast, med. fat	7	185	2.30	0.09		77
Pork, loin, smoked, cooked, lean	27	219	2.30			3,100
Pork sausage	2	27	0.22			
Pork sausage, fried	20	141	3.30	0.15		1,390
Post Toasties	55	54	1.67	0.15		1,216
Potato soup	46	52	0.39	0.08		542
Potatoes, sweet, boiled	21	44	0.62	0.15		60
Potatoes, sweet, raw	19	45	0.92	0.15	0.15	94
Potatoes, white, raw	14	58	0.85	0.17	0.10	38
Potatoes, white, new, boiled	5	33	0.46	0.15		46
Potatoes, white, old, boiled	4	29	0.48	0.11		41
Potatoes, white, dehydrated	25	103	3.70			
Potatoes, French fried	14	72	1.35	0.27		140
Potatoes, mashed	12	32	0.45	0.10		71
Potatoes, roast	10	53	0.99	0.20		103
Prawns, cooked	145	349	1.10			2,550
Prune pudding, Heinz	69	54	1.10	0.16		
Prunes, California, 20 per cent water	62	98	4.50	0.31	0.43	27
Prunes, canned	51		1.53	0.15	0.13	
Prunes, dried	58	85	3.80	0.41	0.18	17
Prunes, dried, cooked	15	30	0.81			
Puffed Rice	10	100	1.07	0.56	0.73	
Puffed Wheat	40	420	4.10	0.70	2.72	
Pumpkin	23	46	1.10	0.03	0.04	36
Pumpkin, California, canned	31	14	1.04	0.20	0.29	
Pumpkin, custard	40		1.83	0.09	0.08	

Q

Quail	15	270	3.80			
Quinces	14	19	0.32	0.14	0.04	2

R

Rabbit, stewed	11	199	1.90	0.20		43
Radishes	31	31	1.36	0.16	0.05	54

For ionizable iron, refer to page 769. † 70 per cent water

It is now customary to restore, fortify or otherwise augment mineral values of cereal products. Consult label on food.

(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

...tems	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
...ded	64	132	6.99	0.27	0.32	82	135
...lless			4.13	0.20	0.34		
...at *Cereal*	50	400	4.00	0.60	4.00		
...a: *Oats*	70	430	2.10				
..., red, fresh	49	52	0.99	0.13	0.51	22	36
...juice	21	12					
...esh	44	18	0.86	0.05	0.15	36	59
...tewed	72	15	0.28	0.09		61	100
..., raw	84	290	2.00	0.36	1.70		
...ied, cooked	2	24	0.20				
...ied, raw	11	99	0.98	0.19	1.08	54	89
...ng	138	120	0.14	0.05		133	219
...nted, Japan- ...	9	70	0.50				
...s, Heinz	12	181	0.40				
...*ies*, Kellogg	11	100	2.67	0.23			
...*ed*	10	100	1.07	0.56	0.73		
...baked in vine- ...	13	402	2.30			173	285
... fried	17	504	1.60			188	310
...ng, fried	16	915	1.50			123	203
...	23	241	1.20				
...in, enriched	56	100	1.8				
...eet, unenriched	56	100	0.5				
...	45	53	0.42	0.04		73	120
...	87	81	2.66	0.21		174	287
...ns	74	56	1.07	0.15	0.13	58	96
...ire	55	385	3.90			25	42
...r	18	289	2.83	0.42	1.94	55	91
...*o*	70	400	4.00	0.33	3.50	1,212	2,000

S

... canned	66	285	1.30	0.05		865	1,425
... fresh	10	245	0.83	0.19	0.01		
... fresh, steamed	29	302	0.80			64	105
... smoked	26	276	1.30				
...boiled	60	53	1.23	0.12		46	76
...le	12	Trace	0.30	0.66		60,300	98,820
...k, fat	2	42	0.60				
...	26	6				87	143
...	25	264	1.30				
..., canned	409	683	4.00	0.04		1,200	1,980
..., canned in oil, ...d solids	35	365	1.80				
...aut	40	10	3.28	0.10			
...aut juice							2,500
..., beef, fried	21	168	4.10	0.17		1,770	3,016
..., black	31	27	19.50	0.26		1,320	2,175
..., breakfast	22	86	1.90	0.08		1,300	2,140
..., pork, fried	20	141	3.30	0.15		1,390	2,290
...abbage, boiled	53	27	0.72	0.07		9	15
..., steamed	115	338	3.00			410	675
...with egg)	47	118	0.97	0.07		127	209
...without egg)	63	110	0.66	0.08		125	207
... cooked	48	34	0.60	0.07		12	20
...s	18	114	1.04	0.15		71	117
...			0.48	0.22	0.02		
...e, raw	23	241	1.20				
...d's pie	15	88	2.31			583	960
...ead	16	69	0.62	0.06		141	233

...nizable iron refer to page 769.

(Estimated in milligrams per 100 grams of moist weight)

(*Italicized letters* indicate trade names.)

Food items.	Ca	P	Fe*	Cu	Mn	Cl
Shredded Wheat	41	324	4.50	0.62	2.39	55
Shredded Wheat Biscuit Kellogg	43	384	6.88	0.96	2.39	55
Shrimp	96	171	2.67	0.43	0.03	
Shrimp, canned	75	210	2.00			
Shrimps, cooked	320	270	1.80	0.80		5,850
Smelts, fresh water			0.41	0.33	0.03	
Smelts, fried	686	535	3.30			138
Sole, fried	131	260	1.40			193
Sole, steamed	113	270	0.70			132
Soursop	9	30	0.38			
Soy bean curd	34	111	1.80			
Soy bean sauce						8,800
Soy bean milk	34	40				
Soy beans, fermented	88	236	3.70			
Soy beans, green, cooked	97	273	2.10			
Soy beans, whole, mature	227	586	8.00			
Soy flour, flakes, grits:						
Low fat	265	623	13.00			
Medium fat	244	610	13.00			
Full fat	195	553	12.10			
Spaghetti, cooked	4	25	0.21			
Spaghetti, raw	22	144	1.25			
Spaghetti in tomato sauce, Heinz	20	29	0.30	0.10		
Spanish melon	14	9	0.24	0.04		45
Spareribs	8	157	2.20			
Spinach, fresh	77	40	4.00	0.12	0.70	74
Spinach, cooked	595‡	93	4.00	0.26		55
Sponge cake	35	145	1.61	0.04		103
Sprats, fresh, fried	707	635	4.50			182
Sprats, smoked, grilled	436	565	5.70			1,330
Spring greens, cooked	86	31	1.33	0.08		16
Squab, with skin	12	217	3.00			
Squash, Hubbard	19	28	0.55	0.04	0.16	
Squash, summer, no seeds	18	16	0.35	0.08	0.14	
Steak and kidney pie	10	213	5.57			1,192
Stew meat, 73% lean beef	9	170	2.40			
Stew meat, 74% lean veal	11	197	2.70			
Stout	10	23	0.14	0.12		36
Strawberries, fresh	41	28	0.66	0.02	0.06	6
String beans	50	51	0.95	0.10	0.24	24
Sturgeon, steamed	15	263	2.00			138
Suet	6	7	0.40	0.04		18
Suet pudding, plain	45	60	0.41	0.04		156
Sugar, Demerara	53	20	0.89	0.06		35
Sugar, white	1	Trace	0.04	0.02		Trace
Sultanas, dried	52	95	1.82	0.35		15
Sunfish, common			0.34	0.14	0.03	
Surinam-cherry	15	20	0.33			
Swedes, boiled	42	18	0.29	0.04		9
Sweetbreads, stewed	14	596	1.60			74
Sweet potato, boiled	20	43	0.62	0.15		60
Sweet potato, raw	19	45	0.92	0.15		94
Swiss chard	87	40	4.02	0.11	0.80	39
Swiss cheese	1,086	812	1.20	0.13	0.16	
Swordfish	19	195	0.90			
Syrup, English golden	26	20	1.45	0.09		42

* For ionizable iron, refer to page 769. ‡ See page 7[illegible]

It is now customary to restore, fortify or otherwise augment mineral va[illegible] cereal products. Consult label on food.

(Estimated in milligrams per 100 grams of moist weight.)

(*Italicized letters* indicate trade names.)

T

tems.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
	113	96	0.60			7	11
	41	17	0.61	0.09	0.04	2	3
dding (baked)	116	95	0.98	0.04		96	158
w	16	6	1.60		0.69	18	30
ned	26	61					
n	Trace	1	Trace	Trace		Trace	Trace
e-made	11	10	0.55	0.04		40	66
w	11	26	0.44	0.06	0.14	34	56
led	15	25	0.50	0.12		59	97
nned	7	26	1.20	0.09	0.04		
tsup	11	17	0.87	0.49	0.03		
ice	6	15	0.29	0.03	0.06	55	90
ice, canned			1.30				
ice, Heinz	5	17	0.80	0.05			
ice, Welch	8	15				57	94
d rice, , Heinz	32	44	1.70	0.66			
x, pickled	31	229	3.00			3,000	4,940
heep, stewed	11	196	3.40			80	132
lack	495	31	9.17	0.43		815	1,340
f	9	42	3.78		0.02		
wed	127	132	1.60			30	50
	33	296	4.00				
	19	204	0.78	0.33†	0.03		
eamed	36	270	1.00			70	116
a, steamed	12	290	1.00			261	430
	24	62				39	64
fish, canned, d solids	34	290	1.70				
fish, canned, contents	30	252	1.50				
h, canned in oil	26	276	1.30				
h, fresh	19	195	0.90				
steamed	14	188	0.50			142	234
dark meat,	23	423					
dark meat, raw	12	231	2.04	0.20	0.05		
light meat,	20	373					
light meat, raw	15	277	1.03	0.15	0.03		
reens	347	49	3.48	0.09	1.42	168	277
reens, cooked	98	45	3.08	0.09		15	25
	64	46	0.70	0.09	0.04	41	68
boiled	55	19	0.35	0.04		31	51

V

tems.	Ca	P	Fe*	Cu	Mn	Cl	Cl as NaCl
Wafers	79	39					
p, med. fat	12	215	2.70	0.25	0.03		
et	13	228	3.00	0.25			
cle	15	223	2.50		0.03		
st	15	287	3.60				
e marrow,	14	13	0.22	0.03		14	23
armite)	980	2,620	4.60	0.60	Trace	6,760	11,140
roast	29	286	7.80			89	147
ausage, canned	19	164	0.60				
	15	32	0.47	0.04		47	77
cider	16	13	0.30				

nizable iron, refer to page 769
rout.

(Estimated in milligrams per 100 grams of moist weight)
(*Italicized letters* indicate trade names.)

W

Food items.	Ca	P	Fe*	Cu	Mn	Cl	[illegible]
Walnuts, black			5.98		3.21		
Walnuts, English	89	358‡	2.14	1.00	1.80	46	[illegible]
Watercress	157	52	7.21	0.04	0.54	62	[illegible]
Water chestnuts	2	65	1.80				
Watermelon	8	13	0.23	0.07	0.02	8	[illegible]
Welsh rarebit	409	302	0.69	0.06		832	[illegible]
Wheat bran	120	1,215	12.70	1.17	9.11	96	[illegible]
Wheat, breakfast, Heinz	27	291	1.20				
Wheat cereal, Ralston	40	400	4.00				
Wheat, Cream of, cooked			0.83	0.28	0.44		
Wheat, entire	53	374	5.00	0.72	3.44	68	[illegible]
Wheat flour:							
Patent, enriched	19	93	2.90				
Self-rising, enriched	220	330	2.90				
Whole wheat	38	385	3.80				
Wheat germ	71	1,050	10.00			70	[illegible]
Wheat, gluten	78	200				50	[illegible]
Wheat Krispies, Kellogg	50	292	5.00	0.63			
Wheat Krumbles, Kellogg	37	337	10.67	0.53			
Wheat Oata, Ralston	70	430	2.10				
Wheat, Puffed	40	420	4.10	0.70	2.72		
Wheat, refined, breakfast cereal	39	347	4.50	2.40			
Whey	44	35				119	[illegible]
Whey, dried	572	524					
Whitefish	150	263	0.42	0.19			
Whiting, fried	48	258	0.70			194	[illegible]
Whiting, steamed	42	189	1.00			93	[illegible]
Whole Wheat Flakes, Kellogg	43	374	6.33	0.53			
Whole wheat flour	31	238	2.50			70	[illegible]
Whortleberries, fresh	20	18					
Winkles, boiled in salt water	136	219	15.00			1,800	[illegible]
Winkles, boiled in fresh water	165	277	17.10			500	[illegible]

Y

Food items.	Ca	P	Fe*	Cu	Mn	Cl	[illegible]
Yam bean, fresh root	9	20	1.90				
Yams	8	41	7.40				
Yeast, Fleischmann	24	561	Trace			Trace	Trace
Yorkshire pudding	101	128	0.68	0.06		662	[illegible]

* For ionizable iron, refer to page 769.
‡ See page 769.
It is now customary to restore, fortify or otherwise augment mineral values of cereal products. Consult label on food.

ble 72. **Mineral Content of Strained and Chopped Foods Prepared for Infant Feeding.**

(Estimated in milligrams per 100 grams of moist weight.)

Food items.	*Ca*	*P*	*Fe*	*Cu*	*Mn*
Foods					
, green	17	24	0.60 (0.35)*		
	13	17	0.36 (0.31)*		
ts	29	22	0.33 (0.25)*		
ken soup	19	27	0.49 (0.38)*	0.06	
pple rice pudding	41	43	0.23 (0.19)*	0.10	
es	11	29	1.02 (0.84)*		
n rice pudding	63	68	0.41 (0.40)*	0.07	
ach	56	37	1.07 (0.71)*		
table and beef	20	31	1.03 (0.67)*	0.09	
table and lamb	36	47	0.61 (0.59)*	0.08	
tables with bacon	28	30	0.43 (0.28)*	0.15	
ned Foods					
le and apricot	12	12	0.27 (0.26)*	0.04	
le sauce	30	53	0.36 (0.31)*		
ns, green	22	21	0.54 (0.30)*		
ts	20	14	0.50 (0.46)*		
rots	16	14	0.40 (0.41)*		
cken soup	36	16	0.69 (0.62)*	0.17	
stard pudding	75	60	0.37 (0.17)*	0.15	
er soup	21	25	3.81 (3.73)*	0.09	
aches	27	26	0.68 (0.40)*	0.11	
ars	16	9	0.44 (0.33)*	0.23	
as	16	50	0.87 (0.81)*		
neapple pudding	49	59	0.32 (0.30)*	0.07	
unes	45	20	0.62 (0.63)*		
inach	71	43	1.18 (0.77)*		
matoes with milk	66	66	0.62 (0.61)*	0.20	
getable and beef	26	36	0.42 (0.41)*	0.13	
getable and lamb	29	39	0.52 (0.45)*	0.22	
getable soup	24	27	0.53 (0.41)*		
getables with bacon	27	38	0.28 (0.19)*	0.17	
ell:					
ained Soups					
eef	46	68	0.40	0.17	0.05
hicken	26	42	0.22	0.24	0.07
amb	46	68	0.35	0.12	0.05
iver	13	65	0.72	0.35	0.17
egetable	24	51	0.73	0.24	0.02
:					
cooked Cereals, Dry					
Baby cereal	800	580	30.00	2.00	
Baby oatmeal	820	670	30.00	0.80	
nior Foods					
Apple sauce	6	11	0.65	0.09	
Apricots and farina	20	14	0.20	0.19	
Carrots	15	25	0.04	0.10	
Chicken soup	15	23	0.63	0.27	
Chocolate pudding	93	82	0.36	0.16	
Fish chowder	22	33	0.97	0.11	
Peaches	17	13	0.52	0.17	
Pears	11	10	0.59	0.09	
Pineapple pudding	54	53	0.12	0.25	
Prunes	23	30	0.42	0.18	
Spinach	73	37	0.35	0.35	
Vegetable soup	21	29	0.54	0.14	
Vegetables, creamed	23	27	0.57	0.18	

igure in parentheses is available iron as against total iron.

Food items.	*Ca*	*P*	*Fe*	*Cu*
Clapp:				
Junior Foods (cont.)				
Vegetables with bacon	22	34	0.56	0.11
Vegetables with beef	16	35	0.65	0.10
Vegetables with lamb	23	46	0.25	0.13
Vegetables with liver	17	53	1.03	0.27
Strained Foods				
Apple sauce	6	11	0.58	0.04
Apricots and apples with farina	15	16	0.53	0.09
Beans, green	32	20	0.22	0.13
Carrots	26	23	0.03	0.09
Chicken soup	50	49	0.26	0.10
Custard pudding	76	78	0.28	0.18
Liver soup	13	60	0.51	0.46
Peaches	8	14	0.51	0.11
Pears	9	12	1.13	0.11
Peas	18	64	0.63	0.36
Squash	32	16	0.02	0.10
Vegetable soup	13	17	0.26	0.13
Vegetables, creamed	52	65	0.13	0.29
Vegetables, mixed	19	32	0.70	0.04
Vegetables with bacon	21	30	0.56	0.17
Vegetables with beef	14	27	0.40	0.13
Vegetables with lamb	18	42	0.65	0.17
Gerber:				
Precooked Cereals, Dry				
Barley cereal	494	680	51.0	
Cereal food	530	656	50.0	
Strained oatmeal	516	645	46.0	
Chopped Foods				
Apple prune pudding	45	37	0.9	
Beans, green	28	24	1.1	
Carrots	35	21	0.3	
Meats:				
Beef	10	227	7.6	
Liver	13	232	4.4	
Veal	9	430	9.1	
Peaches	3	14	0.9	
Pineapple rice pudding	41	40	0.6	
Spinach	68	50	1.4	
Vegetable and beef	18	32	0.7	
Vegetable and lamb	15	43	0.9	
Vegetable and liver	18	47	1.3	
Strained Foods				
Apple sauce	4	6	0.6	
Apricots with farina	11	19	0.5	
Beans, green	25	24	0.7	
Beets	19	20	0.8	
Carrots	21	19	0.5	
Chocolate custard	96	90	0.5	
Custard pudding	96	87	0.5	
Liver soup	15	76	3.9	
Meats:				
Beef	10	160	5.6	
Liver	9	287	6.5	
Veal	10	158	8.0	
Mixed vegetables	21	39	0.9	
Peaches	4	10	3.1	
Pears	8	13	0.6	
Pear pineapple	14	10	3.1	
Peas	17	63	1.2	
Prunes	21	17	3.4	
Spinach	68	52	1.2	

Food items.	Ca	P	Fe	Cu	Mn
ED FOODS (cont.)					
sh	18	17	0.3		
able and lamb	13	43	0.8		
able soup	17	45	0.8		
OKED CEREALS, DRY					
l food	780	620	32.0	1.70	
eal	1040	780	32.0	0.85	
FOODS					
le, fig and date dessert	39	19	2.7	0.12	
ken farina vegetable orridge	43	72	2.3	0.36	
pped carrots	38	21	1.5	0.04	
pped green beans	34	25	0.5	0.40	
pped mixed vegetables	30	26	5.4	0.04	
pped spinach	174	35	2.3	0.08	
amed diced vegetables	99	61	1.2	0.11	
amed tomato and rice	32	44	1.7	0.66	
eapple rice pudding	51	33	1.4	0.08	
ne pudding	69	54	1.1	0.16	
getables with lamb and iver	44	59	0.8	0.38	
INED FOODS					
ple prune pudding	36	40	0.9	0.12	
ple sauce	4	3	0.2	0.20	
ricots and apple sauce	12	19	1.3	0.10	
ricots with oatmeal	10	22	0.5	0.11	
eans, green	52	31	0.1	0.07	
eef and liver soup	21	40	2.2	0.18	
eef broth with beef and barley	21	39	0.8	0.15	
eets	17	37	1.6	0.19	
arrots	29	29	1.0	0.10	
ustard pudding	81	61	0	0.05	
range pudding	36	39	0.5	0.12	
eaches	7	14	0.3	0.06	
ears and pineapple	14	8	0.8	0.16	
ears with farina	9	16	0.2	0.05	
eas	12	83	1.6	0.22	
runes	33	32	1.8	0.16	
pinach	57	39	1.0	0.03	
omato soup	22	39	0.9	0.21	
egetable soup	26	25	1.0	0.10	
egetables and lamb	18	23	0.4	0.10	
MOGENIZED FOODS					
pples and apricots	8	17	1.4		
pples and prunes	17	19	1.8		
pple sauce	7	10	0.2		
pricot-farina	13	18	1.0		
eans, green	32	34	1.2		
eets	17	34	0.5		
arrots	32	28	1.3		
ustard pudding	72	122	0.4		
ruits, mixed (apricot, peach, pear)	9	20	1.6		
iver soup	19	81	2.1		
eaches	10	22	1.3		
ears and pineapple	11	13	0.8		
eas	15	53	2.4		
runes with pineapple and lemon juices	34	43	5.6		
pinach	112	27	2.2		
quash	44	12	0.3		

Food items.	*Ca*	*P*	*Fe*
Libby:			
HOMOGENIZED FOODS (cont.)			
Vegetable soup	33	80	2.2
Vegetables, garden (carrots, peas, spinach)	45	39	1.3
Vegetables, mixed (green beans, pumpkin, tomato)	26	31	1.2
Vegetables with bacon	16	35	0.6
Vegetables with beef	22	65	2.1
Vegetables with lamb	41	65	0.9
Swift:			
DICED MEATS			
Beef	10	210	3.3
Heart	15	220	4.8
Lamb	18	180	2.4
Liver	30	330	7.2
Pork	14	200	1.5
Veal	11	210	1.6
STRAINED MEATS			
Beef	12	140	2.8
Heart	12	150	3.6
Lamb	16	170	2.3
Liver	40	270	7.7
Pork	14	180	1.7
Veal	17	180	1.6

SULFUR IN FOODS.

Introduction.—In fruits and vegetables the sulfur content is low and exceedingly variable from sample to sample. In its determination considerable sulfur in the form of essential oils may be lost through volatilization. When dried fruits are treated with sulfur dioxide for preservation, unduly high values may be anticipated. The use of sulfate manures increases the sulfate content of the products grown thereon. The enormous sulfur content of carrageen moss is probably due to large quantities of inorganic sulfate.

Sulfur occurs in foods chiefly in organic combination, protein forms being the most important. The sulfur content of the following proteins is from Osborne, cited by Hutchison and Mottram† (1936), and is calculated on the dry basis:

	Per cent.		Per cent.
Albumin, serum	1.930	Legumin	[illegible]
Caseinogen	0.800	Ovalbumin	[illegible]
Edestin	0.880	Ovovitellin	[illegible]
Excelsin	1.086	Oxyhemoglobin	[illegible]
Gliadin	1.027	Zein	[illegible]

† Food and Dietetics, Hutchison, R., and Mottram, V. H., 9th edition, Baltimore, Wm. Wood & Co., 1941.

TABLE 73.—**The Sulfur Content of Various Foods.***

timated in milligrams of S per 100 grams of edible substances.)

	Mg. %.	Food items.	Mg %.
ogg's	182.0	Cheese, cheddar	230.0
	145.0	Dutch	186.5
g, raw	2.9	Gorgonzola	177.0
	7.6	Gruyère	206.0
	6.1	Parmesan	251.0
	1.0	Stilton	228.0
	164.0	St. Ivel	186.0
	1.6	Cherries, cooking, raw	6.8
obe, boiled	15.5	Eating	7.9
boiled	21.6	Glacé	21.0
oiled	46.6	Chestnuts	29.4
	19.4	Chicken, roast	232.0
	13.0	Chicory, raw	12.7
	117.0	Chocolate, milk	67.0
d	50.7	Plain	32.0
led	27.0	Cocoa	160.0
w	109.5	Cocoanut	44.0
	47 2	Milk	23.8
oiled	8.3	Cod	171.0
aw	166.5	Baked	256.0
	46.3	Coffee	110.0
d	222.0	*Corn Flakes*, Kellogg's	92.5
	203.0	Crackers:	
	271.0	Cream	77.8
	287.0	Plain	83.4
	212.0	Sweet	31.8
d	341.0	Cranberries, raw	11.1
		Cream	33.0
draught	23.2	Cucumber, raw	11.0
d	23.8	Currants, black, raw	33.1
, draught	20.4	Red, raw	28.6
d	25.2	White, raw	23.6
le	34.1	Dried	30.8
	23.1	Curry powder	86.0
ed	22.1	Dates	51.0
es	12.5	Doughnuts	56.4
	362.0	Duck, roast	395.0
eep	108.0	Eel	130.0
s	293.0	Egg white	182.5
ite	54.5	Yolk	164.5
wheat	76.0	Eggplant, raw	9.0
ops, boiled	45.0	Endive	25.7
sprouts, boiled	77.8	Fat, dripping	9.2
rrant	73.4	Figs, dried	80.8
	9.1	Green	12.9
, red, raw	68.0	Fish paste	185.0
boiled	30.4	Flour, white	108.5
, boiled	26.7	Whole wheat	123.5
r, boiled	23.4	*Force*	105.0
ipe	11.7	Fruit salad, canned	1.8
n moss, dried	5460.0	Ginger, ground	145.0
old, raw	6.9	Goose, roast	326.0
led	5.0	Gooseberries, green	15.9
g boiled	9.3	Ripe	13.5
wer, boiled	29.4	Grapefruit	5.1
, boiled	12.8	*Grape-Nuts*, Post's	145.0
raw	14.9	Grapes, black	7.4
d	8.3	White	9.1

* Masters, M., and McCance, R. A.: Biochem. Jour., 33, 1308, 1939.

Food items.	Mg. %.	Food items.	Mg. %.
Haddock, fresh	226.0	Peaches	[illegible]
Smoked	221.0	Canned	[illegible]
Steamed	227.0	Dried	[illegible]
Hake	164.0	Peanuts	[illegible]
Ham, boiled	233.0	Pears, cooking (raw)	[illegible]
Hare, roast	347.0	Eating	[illegible]
Hare, stewed,	320.0	Canned	[illegible]
Hazelnuts	74.5	Peas, fresh, raw	[illegible]
Herring	212.0	Boiled	[illegible]
fried	270.0	Dried, raw	[illegible]
Honey	0.8	Boiled	[illegible]
Honeycomb	0.8	Split, dried, raw	[illegible]
Horseradish	212.0	Boiled	[illegible]
Ice-cream	30.6	Canned	[illegible]
Jam, edible seeds	6.5	Pepper	[illegible]
Stone fruits	3.2	Pheasant, baked	[illegible]
Jelly, com.	36.6	Pineapple	[illegible]
Kippers	225.0	Canned	[illegible]
Lamb cutlet	166.0	Plaice	[illegible]
Lard	24.8	Fried	[illegible]
Leeks, boiled	48.9	Plums, cooking (raw)	[illegible]
Lemons, whole	12.3	Damson	[illegible]
Juice	2.0	Eating	[illegible]
Lentils, raw	122.5	Greengage	[illegible]
Boiled	37.3	Pomegranate juice	[illegible]
Lettuce	11.8	Pork, leg	[illegible]
Loganberries	18.1	*Post Toasties*	[illegible]
Canned	3.0	Potatoes, new, boiled	[illegible]
Macaroni	95.0	Old, raw	[illegible]
Mackerel	162.0	Boiled	22.2
Malted Milk, Horlick's	167.0	French fried	44.7
Margarine	12.1	Roast	56.3
Marmalade	2.1	Prawns	335.0
Marmite (*Vegex*)	382.0	Prunes	18.5
Meat paste	131.0	Pumpkin, raw	9.5
Milk, fresh, whole	29.2	Rabbit	169.0
Condensed whole, unsweetened	75.0	Rabbit, stewed	245.0
Condensed whole, sweetened	82.5	Rabbit, *see* Hare.	
Condensed skim, sweetened	94.3	Radishes	37.5
Mince meat	28.4	Raisins	23.0
Molasses, *see* Treacle.		Raspberries	17.3
Mulberries	8.8	Rhubarb	8.2
Mushrooms, raw	33.8	Rice	[illegible]
Fried	73.8	Roe, cod's	212.0
Mussels	326.0	Herring's	175.0
Boiled	262.0	Rusk	107.0
Mustard	1280.0	*Ryvita*	[illegible]
Mustard and cress, raw	170.0	Sago (tapioca)	0.5
Mutton chop	197.0	Salmon	192.0
Leg	164.0	Canned	241.0
Nectarines	10.0	Canned in oil	246.0
Oatmeal	155.0	Salsify, boiled	25.2
Olives, brined	35.6	Salt, table	[illegible]
Onions, raw	50.7	Sausages, beef, fried	[illegible]
Boiled	23.7	Black	[illegible]
Fried	87.8	Breakfast	[illegible]
Spring, raw	50.0	Pork, fried	[illegible]
Oranges, whole	9.0	Scallops	342.0
juice	4.6	Seakale, boiled	[illegible]
Ovaltine	183.0	Semolina	[illegible]
Oxo	321.0	Shrimp	[illegible]
Parsnips, raw	16.5	Smelts	[illegible]
Boiled	14.6	Sole, Dover	[illegible]
Passion fruit	18.7	Spinach, boiled	[illegible]

BLE 73 (CONTINUED). The Sulfur Content of Various Foods.

ems.	Mg. %.	Food items.	Mg. %.
noked	222.0	Trout, rainbow	169.0
ens, boiled	28.5	Turbot	188.0
ies	13.4	Turkey, roast	234.0
	20.0	Turnips, raw	22.1
merara	14.0	Boiled	21.2
aw	39.1	Turnip tops, boiled	39.0
	30.5	Veal	191.0
tatoes, boiled	14.9	Vegetable marrow, boiled	5.5
olden," corn	53.8	*Vegex*	382.0
es	10.3	Vinegar	18.6
(minute)	3.5	Walnuts, English	104.0
	177.0	Watercress	127.0
, raw	10.7	Whelks	401.0
	9.2	Whiting	257.0
black	68.5		

BROMINE CONTENT OF FOODS.

roduction.—Geographic location and climatic conditions are mining factors in the bromine content of foodstuffs. Those of ne origin or grown near the sea are always relatively richer those produced inland. Comparative data are shown in e 74. There is also a selective affinity on the part of the rent plant tissues. The green parts are invariably richer than roots of the same plant. Cereal grains are relatively low in nine. Although fruits frequently contain very little of this ent, there are outstanding exceptions as watermelon, musk- on, and tomatoes.

ethods for ascertaining the bromine content of foods are thor- ly discussed by Neufeld. Analyses by this investigator com- on the whole with those of Damiens and Blaignon, although latter tend to be higher. The source of the French material is so clearly defined as in the case of the figures from western ada.

TABLE 74.—**Bromine Content of Some Foods.***

Food items.	Br in dried material, mg. %.	Food items.	Br in dried material, mg. %.
Almonds (Fr.)	Negligible	Milk (i)	[illegible]
Apples (c)	0.30	Millet (Fr.)	[illegible]
(Fr.)	Trace	Mushrooms (Fr.)	[illegible]
Apricots (Fr.)	0.28	Muskmelon (Fr.)	[illegible]
Artichokes (Fr.)	0.98	Oats (Fr.)	[illegible]
Jerusalem (Fr.)	0.62	Onions (Fr.)	[illegible]
Asparagus (Fr.)	2.02	Oranges (Fr.)	[illegible]
Bananas (Fr.)	0.54	Oranges (c)	[illegible]
Barley (Fr.)	0.55–0.56	Peel	[illegible]
Beans, favé (Fr.)	0.18	Parsnips (i)	[illegible]
Haricot verts (Fr.)	0.64	Peaches (c)	<[illegible]
Mature (Fr.)	Trace	(Fr.)	Trace
Beets (i)	<0.20		[illegible]
(Fr.)	0.37–0.55	Pears (c)	[illegible]
Bread, white (Fr.)	0.09–0.61	(Fr.)	Negligible
Whole wheat (Fr.)	0.68	Peas, mature (Fr.)	[illegible]
White (i), unwrapped	0.70	Pods (Fr.)	[illegible]
Wrapped	0.30	Plums (Fr.)	Negligible
Cabbage (c)	2.50	Potatoes (i)	<[illegible]
(i)	0.20	(Fr.)	[illegible]
(Fr.)	0.45	Quinces (Fr.)	Negligible
Carrots (c)	3.60	Radishes (Fr.)	0.83
(i)	<0.20	Raspberries (c)	0.9[illegible]
(Fr.)	0.39	(Fr.)	Trace
Cauliflower (Fr.)	0.67–0.73	Rhubarb (i)	0.90
Celeriac (Fr.)	0.38–0.47	(Fr.)	0.75
Celery (c)	17.6	Rice (Fr.)	Trace
Cherries (Fr.)	Trace	Rye (i)	0.55†
Corn (i)	0.6†	(Fr.)	0.19
(Fr.)	0.15–0.19	Shallots (Fr.)	0.52
Cucumber (i)	4.0	Strawberries (Fr.)	0.71
Currants, black (Fr.)	0.094	Tangerines (Fr.)	0.53
Red (Fr.)	0.088–0.17	Tomato (c)	1.40
Figs (Fr.)	0.18	(i)	0.30
Flour (Fr.)	0.09–0.12	(Fr.)	0.95–5.34
Fungi, edible (Fr.)	0.19–3.62	Turnips (c)	2.40
Garlic (Fr.)	0.44	(Fr.)	0.31–0.[illegible]
Grapes (c)	1.10	Turnip greens (c)	4.25
(Fr.)	0.195	Watermelon (Fr.)	26.20
Grapefruit (c)	0.90	Wheat (i)	0.10†
Peel	<0.30	(Fr.)	0.21
Leeks (Fr.)	0.30	Wheat-germ flour (i)	0.10
Lentils, dry (Fr.)	1.00	Oil (i)	<0.03
Lettuce (i)	1.90	Yeast, top (Fr.)	0.30

* Data from Neufeld, A. H. (Canad. Jour. Res., **14**, Sec. B., 160, 1936) are grouped according to source of food as inland (i) or coastal (c); analyses of Damiens, A., and Blaignon, S. (Compt. rend., **193**, 1460, 1931; Ibid., **194**, 2077, 1932) are indicated by (Fr.)

† On fresh basis.

IODINE IN FOODS.

ction. —Methods for determination of iodine where it occurs e amounts are far from satisfactory. No figure has been in Table 75 which was not considered acceptable. The al difficulties, however, must not be overlooked. Since many instances is a highly variable and accidental con- of food, the tabulated data should be carefully evaluated. analyses are reported on both the wet and dry basis. of the wide variation in the water content of food samples, ause of the minute concentration of iodine, data on the ed material are more satisfactory to the analyst. Figures fresh food, however, are more readily evaluated by the . The iodine concentration is expressed in a variety of as parts per million or billion (thousand million), as gamma cent, as micrograms per kilogram, as milligrams per kilogram. gram (γ or μg.) is 0.001 mg. or one-millionth of a gram.

$$\begin{aligned}
\text{mg. I per kg.} &= \text{p.p.m.} \\
1000\ (\text{mg. I per kg.}) &= \text{p.p.b.} \\
\gamma\ \text{per gram} &= \text{p.p.m.} \\
\gamma\ \text{per cent} &= \text{p.p. 100 m.} \\
\gamma\ \text{per kilo} &= \text{p.p.b.}
\end{aligned}$$

ample, 0.450 mg. I per kg. = 0.450 p.p.m. = 450 p.p.b. = per kg.

served fish and fishery products contain iodine in quantities rable to those of fresh fish. Fish roes are especially rich in . Liquors from canned shell-fish have a high iodine content. are a few sea-foods which rank higher in iodine content than ster, but these are usually not so widely distributed, nor so obtainable. The iodine of shrimp and crab is concentrated in the non-edible portion (Coulson).

iodine content of plants is at a maximum in autumn and . Plants grown on the same soil take up varying amounts ine. Onions and asparagus appear to pick up more than ges. The latter in turn exceed the legumes which absorb iodine from the earth than the cereals. The fruits take up ss iodine. Iodine uptake tends to vary directly with the available for the growing crop.

ne is more plentiful in those parts of plants where green g matter is most intense. Young green leaves contain more tiolated leaves, stems more than roots, and leaves than stems r *et al.*, 1935).

effect of cooking upon Chinook salmon is given by Jarvis:

444 p.p.b. (fresh)	Raw	524 p.p.b.	Raw	522 p.p.b.
422 p.p.b. (fresh)	Boiled	528 p.p.b.	Fried	566 p.p.b.

TABLE 75.—**Iodine Content of Various Foods.**
(*Italicized letters* indicate trade names.)

Food items.	Source	D = dry F = fresh	[illegible]
Abalone	Pacific Coast	F	[illegible]
Agar-agar		F	[illegible]
Albacore	Pacific	F	[illegible]
Albacore*	Pacific	D	[illegible]
Alewives‡		F	[illegible]
		D	[illegible]
Alfalfa	Nebraska	D	[illegible]
Alfalfa	Goitrous region	D	[illegible]
Alfalfa	N. goitrous region	D	[illegible]
Almond		D	[illegible]
Almond oil		D	[illegible]
Apples	Nebraska	D	[illegible]
Apples	Oregon, goitrous	D	[illegible]
Apple sauce	Ohio	F	[illegible]
Artichokes	South Carolina	D	[illegible]
Asparagus	California	D	[illegible]
Asparagus	Pennsylvania	F	[illegible]
		D	[illegible]
Asparagus	South Carolina	D	[illegible]
Asparagus†	Ohio	F	51
Bacon	Ohio	F	[illegible]
Banana	America	F	[illegible]
Banana	Spain	F	5
Banana	Italy	F	28
Barley	N. goitrous	D	73
Barracuda	Pacific	F	294
Bass, black	Iowa, Mississippi River	F	10
		D	40
Bass, black	Potomac River	F	50
		D	190
Bass, black	Washington	F	178
Beans*	Mississippi	D	994–1,315
Beef, roasted	Ohio	F	92
Beet tops	South Carolina	D	657
Beets	California	D	8
Beets	Florida	D	220
Beets	Oregon	D	19
Beets	South Carolina	D	182
Beets†	Ohio	F	38
Bing cherries	Oregon, goitrous	D	33
Black bullhead	Iowa, Mississippi River	F	10
		D	40
Blueberries	South Carolina	D	206
Bluefish		F	200
		D	1,870
Bluegill	Iowa, Mississippi River	F	40
		D	180
Bowfin	Iowa, Mississippi River	F	20
		D	80
Bread, white	Ohio	F	132
Bread, whole wheat	Ohio	F	108
Broccoli†	Ohio	F	[illegible]
Buffalofish	Iowa, Mississippi River	F	30
		D	[illegible]
Buffalofish, big mouth	Iowa, Mississippi River	F	20
		D	[illegible]
Buffalofish, razorback	Iowa, Mississippi River	F	[illegible]
		D	[illegible]
Burbot	Atlantic	D	[illegible]
Butter	Ohio	F	[illegible]
Cabbage	Florida	D	[illegible]

* Canned. † Cooked. ‡ Smoked.
N. goitrous = non-goitrous.

(*Italicized letters* indicate trade names.)

d items.	Source.	D = dry, F = fresh	Parts per billion
	Nebraska	D	62
	South Carolina	D	263
	Goitrous	D	7
	N. goitrous	D	30
	Ohio	F	20
hinese	Ohio	F	21
Chinese	South Carolina	D	300
e	Ohio	F	23
	Iowa, Mississippi River	F	10
		D	40
	Washington	F	12
	California	D	8
	Florida	D	240
	Nebraska	D	220
	Oregon, goitrous	D	2
	South Carolina	D	213
	N. goitrous	D	170
	Ohio	F	11
l		D	43
	South Carolina	F	420
		D	1,940
channel	Iowa, Mississippi River	F	10
		D	40
	California	D	14
	Ohio	F	123
eaves	Florida	D	655
talks	Florida	D	291
Swiss	Florida	D	992
cottage	Ohio	F	61
s	America	D	33
uts		F	15
ate		D	30–80
ate beverage	Ohio	F	65
	Lake Erie	F	240
		D	550
oe‡	Lake Erie	F	270
		D	870
hard	America	F	1,370
		D	6,200
Little Neck	Pacific	F	833
minced	New England	F	420
		D	1,970
razor	Pacific	F	1,382
		D	80
butter		D	87
nut oil		D	95
	America	F	240
		D	1,000
	Massachusetts and New York	F	1,030
		D	5,350
	Pacific	F	254
salt		F	660
		D	1,200
sh, buck roe		D	2,230
sh cakes*		F	340
		D	1,150
sh roe*		D	1,510
sh, shredded*		F	310
		D	1,520
liver oil	Maine and New York	D	7,670
liver oil, crude	Scandinavia	D	3,370
liver oil, refined	Scandinavia	D	7,200

* Canned.

† Cooked.

‡ Smoked

N. goitrous = non-goitrous.

(*Italicized letters* indicate trade names.)

Food item.	Source.	D = dry. F = fresh	[illegible]
Coffee	Brazil	D	[illegible]
Collards	Florida	D	[illegible]
Collards	Georgia	D	[illegible]
Collards	South Carolina	D	[illegible]
Conch	Florida	F	[illegible]
		D	[illegible]
Corn	Goitrous	D	4
Corn	Nebraska	D	[illegible]
Corn	N. goitrous	D	[illegible]
Corn	Kentucky	D	[illegible]
Corn, Country Gentleman*	Maryland	D	[illegible]
Corn, sugar*	Maryland	D	[illegible]
Corn, sweet	Pennsylvania	F	[illegible]
		D	[illegible]
Corn†	Ohio	F	52
Crabs, Dungeness	Pacific	F	102
Crabs, King	Pacific	F	[illegible]
Crabs, soft		D	490
Crabmeat	South Carolina	F	425
		D	[illegible]
Crabmeat*	Oregon	F	148
		D	[illegible]
Crabmeat*	Virginia	F	[illegible]
		D	1,180
Crabmeat*	Japanese	D	3,150
Crabmeat flakes, blue	America	F	180
		D	870
Cranberries	Cape Cod	D	100
Cranberries	Cape Cod	F(?)	26–37
Cream, 20 per cent	Ohio	F	57
Cream, whipped	Ohio	F	72
Cucumbers	Florida	D	212
Cucumbers	South Carolina	D	530
Dasheens	Florida	D	228
Dates	Italy	F	5
Dewberries	Florida	D	110
Dewberries	South Carolina	D	169
Eel		D	800
Egg	Ohio	F	108 per egg
Eggplant	Florida	D	147
Eggplant	South Carolina	D	187
Figs, dried	Italy	F	12–69
Finnan haddie*		F	230
		D	820
Flounder	Atlantic	F	290
		D	1,180
Flounder	Washington	F	233
Flounder, winter		F	180
		D	730
Flounder, winter	Cape Cod	F	53
Gar pike	Mississippi River	F	10
		D	40
Grapes, dried	Spain	F	120
Grape juice	Ohio	F	9
Grapefruit		F	13
Haddock	America	F	290
		D	1,050
Haddock	Massachusetts	F	[illegible]
		D	[illegible]
Haddock	New York	F	[illegible]
		D	[illegible]

* Canned. † Cooked. ‡ Smoked.
N. goitrous = non-goitrous.

(*Italicized letters* indicate trade names.)

...d items.	Source.	D = dry. F = fresh.	Parts per billion.
salted		F	320
		D	680
. . . . . .	America	F	250
		D	830
. . . . . .	Washington	F	304
s		D	15
. . . . . .	Washington	F	214
salted		F	490
		D	890
. . . . .		F	530
		D	1,000
milt‡		D	600
roe	Washington	F	951
roe*		D	3,790
roe‡		D	800
. . . . . .	Florida	D	250
. . . . . .	South Carolina	D	278
hop	Ohio	F	146
. . . . . .	America	D	7
uice		F	52
de	Ohio	F	68
. . . . . .	Florida	D	215
. . . . . .	Georgia	D	298–428
. . . . . .	Nebraska	D	71
. . . . . .	Ohio	F	42
. . . . . .	South Carolina	D	912
. . . . . .	Goitrous	D	8
. . . . . .	N. goitrous	D	30
eans	Maryland	D	50
eans, green* . .	Maryland	D	37–69
. . . . . .		D	1,200
d	Washington	D	138
oil		D	54
r	America	F	1,380
		D	11,590
r, spring	Pacific	F	322
r*		F	1,330
		D	5,320
berries	Oregon	D	160
rel, common . .	Massachusetts	F	530
		D	1,280
rel, common, salted .		F	400
		D	660
rel, Spanish . . .		F	400
		D	1,410
rel, Spanish . . .	Washington	F	230
		D	160
. . . . . .	Brazil	F	271
nnaise	Ohio	D	67
whole	Maryland	D	320
whole	Nebraska	F	33
whole	Ohio	D	10
whole	Goitrous	D	25
whole	N. goitrous	D	91
skim	Maryland	D	12
skim	Minnesota	F	84
malted	Ohio	D	400
goat's	California	F	4,850
t	Florida and South Carolina	D	20,490
t, salted		F	290
		D	560

...nned. † Cooked. ‡ Smoked.

N. goitrous = non-goitrous.

(*Italicized letters* indicate trade names.)

Food items.	Source.	D = dry. F = fresh.	[illegible]
Mussels	Atlantic	D	[illegible]
Mussels	Pacific	F	[illegible]
Mussels, sea*		F	[illegible]
		D	[illegible]
Mussels, liquor*		D	[illegible]
Mustard greens	Mississippi	D	[illegible]
Mustard greens	South Carolina	D	[illegible]
Oats	Minnesota, goitrous	D	[illegible]
Oats	N. goitrous	D	[illegible]
Oats, rolled†	Ohio	F	[illegible]
Okra	South Carolina	D	[illegible]
Olive oil		D	[illegible]
Onions	Florida	D	[illegible]
Onions	Nebraska	D	6
Onions	South Carolina	D	[illegible]
Orange juice		F	16
Oysters	Atlantic	F	[illegible]
		D	[illegible]
Oysters	Maryland	D	[illegible]
Oysters	Pacific	F	935
Oysters	Japan	F	[illegible]
Oysters*		F	[illegible]
		D	4,010
Oysters, liquor*		D	9,600
Oyster juice, fresh		F	120
		D	3,170
Peaches	Oregon, goitrous	D	11
Peaches	South Carolina	D	162
Peaches*	Ohio	F	161
Peanuts	Spain	D	200
Peanut oil		D	30
Pears	Nebraska	D	98
Pears	Oregon, goitrous	D	15
Pears, green	California	D	8
Pears, ripe	South Carolina	D	65
Pears, Bartlett*	Ohio	F	22
Peas	California	D	9
Peas*	Pennsylvania	D	65
Pep, Kellogg		F	90
Peppers, Bell	Florida	D	198
Perch, salt water	Pacific	F	176
Perch, white		F	420
		D	1,420
Perch, yellow	Potomac River	F	20
		D	90
Periwinkle		D	750
Pickerel	Potomac River	F	70
		D	300
Pimentos	Georgia	D	22
Pimentos	South Carolina	D	150
Pineapple*		F	22
Plums, fresh	Ohio	F	47
Pollock		F	120
		D	900
Pollock	Massachusetts	F	430
Pompano		F	80
		D	250
Poppyseed oil		D	33
Potatoes	Florida	D	173
Potatoes	Georgia	D	18–140
Potatoes	Idaho	D	110
Potatoes	Maine	D	193

* Canned. † Cooked. ‡ Smoked.

N. goitrous = non-goitrous.

(*Italicized letters* indicate trade names.)

ood item.	Source.	D = dry. F = fresh.	Parts per billion.
		D	38–68
	Maryland	D	94
	Michigan	D	86
	Minnesota	D	Trace
	Nebraska	D	78
	North Dakota	F	40–93
	Pennsylvania	D	150–240
		D	211
	South Carolina	D	8
	Goitrous	D	350
	N. goitrous	F	34
, boiled	Ohio	F	41
, mashed	Ohio	D	101
, sweet	Florida	D	98
, sweet	South Carolina	D	5
	Oregon	F	50
dried†	Ohio	F	32
	Europe	D	200
		F	10
	India	F	32
	Italy	F	151
ispies, Kellogg		D	200
ga	South Carolina	D	312
ga tops	Mississippi	D	3
	N. goitrous	D	42
		F	364
, Chinook	Washington	F	670
, Chinook*	Alaska	D	2,010
		F	242
, Chum	Washington	F	220
, Chum*	Alaska	D	810
		F	230
n, Coho*	Alaska	D	760
		F	264
n, pink	Washington	F	210
n, pink*	Alaska	D	670
		F	405
n, red	Washington	F	530
n, red*	Alaska	D	1,710
		F	206
on, silver		D	1,261
on, sockeye	Washington	D	1,314
on, steelhead	Washington	D	1,980
on oil	Alaska and Washington	D	1,050
nes*	California	D	1,510
nes*	Maine	D	600
nes, salted		D	260
ine oil	California	D	470
ine oil	Maine	F	799
ops	Pacific	F	150
ops, giant		D	810
		F	300
		D	950
o		D	900
	Atlantic	D	30
weed, dried		F	306
ame oil	Washington	F	1,132
d	Washington	F	4,100
d roe	Washington	F	375
d roe*	Pacific	F	230
imp	Georgia, Louisiana and South Carolina	D	1,100
imp		F	450
imp, headed		D	2,250

* Canned

† Cooked.

‡ Smoked.

N. goitrous = non-goitrous.

(*Italicized letters* indicate trade names.)

Food item.	Source.	D = dry. F = fresh.	[illegible]
Shrimp*		F	[illegible]
		D	[illegible]
Shrimp†	Georgia and Alabama	F	[illegible]
		D	[illegible]
Smelt		F	[illegible]
		D	[illegible]
Smelt	Columbia River	F	[illegible]
Snapper, red	Florida and Alabama	F	[illegible]
		D	[illegible]
Snapper, red	Washington	F	[illegible]
Soup vegetables	Oregon, goitrous	D	[illegible]
Spinach	California	D	[illegible]
Spinach	Florida	D	[illegible]
Spinach	Georgia	D	296-[illegible]
Spinach	Maryland	D	[illegible]
Spinach	Nebraska	D	[illegible]
Spinach	Oregon, goitrous	D	[illegible]
Spinach	South Carolina	D	[illegible]
Spinach	N. goitrous	D	[illegible]
Spinach†	Ohio	F	[illegible]
Squash	Florida	D	[illegible]
Squash, summer	South Carolina	D	[illegible]
Squid	Pacific	F	[illegible]
Strawberries	Florida	D	197
Strawberries	South Carolina	D	[illegible]
String beans	Florida	D	267
String beans	Maryland	D	58-75
String beans	Pennsylvania	F	20-33
		D	170-270
String beans	Oregon, goitrous	D	29
String beans	South Carolina	D	210
String beans*	Mississippi	D	70-90
Sturgeon	Washington	F	629
Sugar		F	162
Tapioca		D	12
Tea	Ceylon	F	80
Tea, green	China	F	73
Tomatoes	California	D	26
Tomatoes	Nebraska	D	130
Tomatoes	Ohio	F	26
Tomatoes	Pennsylvania	F	5-19
		D	90-37[illegible]
Tomatoes	South Carolina	D	112
Tomatoes*	Florida	D	[illegible]
Tomatoes*	Maryland	D	16-65
Tomatoes*	Mississippi	D	100
Tomato juice	Ohio	F	47
Trout	Lake Erie	F	10
		D	40
Trout, brook	Washington	F	17
Trout, rainbow	Washington	F	42
Trout, salmon		D	100
Trout, steelhead	Washington	F	[illegible]
Tuna, bluefin	Pacific	F	[illegible]
Tuna, bluefin*		F	[illegible]
		D	[illegible]
Tuna, yellowfin	Pacific	F	[illegible]
Turnip tops	Florida	D	[illegible]
Turnip tops	Georgia	D	111-[illegible]
Turnip tops	Mississippi	D	[illegible]
Turnip tops	South Carolina	D	[illegible]
Turnips	Florida	D	[illegible]
Turnips	South Carolina	D	[illegible]

* Canned. † Cooked. ‡ Smoked

N. goitrous = non-goitrous.

(*Italicized letters* indicate trade names.)

ood items.	Source.	D = dry, F = fresh.	Parts per billion
. . . . .	Ohio	F	68
armite) . . .		F	180
. . . . . .		D	30
ak*		F	<10
		D	<40
lon	South Carolina	D	402
. . . . . .	Canada	D	3–6
. . . . . .	Minnesota, N. goitrous	D	1–7
. . . . . .	Nebraska	D	0
. . . . . .	N. goitrous	D	4–9
a		F	30
h	Lake Erie	F	30
		D	110
. . . . . .		D	300

anned. † Cooked. ‡ Smoked

N. goitrous = non-goitrous.

ANTITHYROID EFFECT OF FOODS IN MAN

It is recognized that goiter may develop in laboratory animals or in man despite presumably adequate intake of iodine. Over the past 20 years evidence has been accumulating to indicate that there are agents in certain foods which are capable of inhibiting the utilization of iodine by the thyroid gland. Probably more than one such substance possesses activity as heating is destructive in some instances but not in others. Apparently water-soluble, the active principle may be leached out in cooking water. It is unlikely that the iodine content of any of the foods, except clams and oysters, was great enough to diminish uptake of I^{131}. Individual foods may show a variable effect; cabbage, for example, becomes more potent with approach of winter. Many persons undoubtedly consume quantities of such food without visible effect, but occasionally the circumstances are just right for thyroid hyperplasia.

TABLE 76.—**Goitrogenic Foods***

Food items.	*Grade.*	*Food items.*	*Grade.*
Almonds, raw	0	Milk, past.	0 to 2
Apples, raw	0	Mustard, dry	0
Apricots, dried	1	Mushrooms, cooked	0
Bananas, raw	0	Olives, pickled green	0
Beans, baked, canned	1	Onions, raw	0
black, cooked	0	Orange juice, fresh	1
lima, cooked	0	Oysters, raw	0 to 2
string, raw	1 to 2	Peaches, froz.	2
cooked	0	Peanuts, raw or roasted	1 to 2
Beefsteak, raw	0	Pears, raw	1 to 2
Beets, cooked	1	juice, fresh	2
Blackberries, froz.	0	canned	0
Broccoli, cooked	0	Peas, raw or cooked	1 to 2
Bonita, canned	0	Pineapple, canned	0
Cabbage, raw	0 to 3	Potatoes, raw or boiled	0
Carrots, raw	0 to 3	Radishes, raw	0
cooked	1	Raisins, Thompson seedless	1 to 2
Cauliflower, cooked	0	Raspberries, froz.	0
Celery, raw	0 to 3	Rice, boiled	0
Cheese, Amer., past.	0	Rutabaga, raw	3 to 5
Clams, raw	1	puréed raw	2
Corn, froz.	0	juice, raw	2
Cucumbers, raw	0	cooked	0 to 1
Custard, baked	1	Rye bread	0
Dates, dried	0	Salt, NaCl	0
Filberts, raw	1	Sardines, canned	0
Grapefruit, raw	2	Shrimp, boiled	0
Grapes, fresh Tokay	0	Spinach, cooked	0 to 2
Green peppers, raw	1	Squash, banana, cooked	0
Ice cream	0	Strawberries, froz.	0 to 5
Lettuce, raw	1 to 2	Tangerines, raw	0
Liver, broiled	1	Tomatoes, raw	0
Lobster, boiled	0	juice, fresh	0
Loganberries, froz.	0	Turnips, raw or cooked	0 to 2
Melon, honey dew	1	Walnuts, raw	1 to 2

* Greer, M. A., and Astwood, E. B.: Endocrinology **43**, 105, 1948. Antithyroid activity was measured by observing the inhibition of radio-active iodine (I^{131}) uptake according to Stanley, M. M. and Astwood, E. B.: Endocrinology **41**, 66, 1947. Foods tested were eaten to satiety and the results graded arbitrarily 0—no inhibition; 1—slight or questionable; 2—moderate depression without complete inhibition; 3—complete inhibition for less than 4 hrs.; 4—complete inhibition from 4 to 24 hrs.; 5—complete inhibition lasting 24 hrs.

VITAMINS IN FOODS.

ıction.—For normal development and growth, for main-
of full health and for production of hardy offspring, certain
ıpart from carbohydrates, fats, proteins and minerals are
in the diet. Among these essential food factors are vita-
ich occur in Nature in minute amounts.

beginning recognition of these agents, it was customary
ss the vitamin content of foods by use of letters, as G for
by employing plus or minus signs. Everyone looked for-
the day when vitamins could be designated in conventional
milligrams per unit weight. More and more methods have
vised to make this possible. As a result a considerable
of numerical data on vitamins is available. These tabu-
present frequent conflicts, a food by methods used in a given
one or more laboratories showing a fair concentration of a
d vitamin and yet appearing at a later date to have no such
ı content. Likewise, foods placed in the "nil" class in some
figures may feature satisfactory concentrations in other
Even under precisely controlled conditions various samples
ected food may reveal widely separated vitamin values. One
pted to ask what it all means.

the opinion of the compiler of the estimated values shown
following tables that one should regard vitamin content as
ct to change without notice". The average person who deals
he practical aspects of diet-making is better off with vitamin
composed of plus signs or letters which indicate the general
nto which the specific food probably falls with respect to a
ılar vitamin. Then, there is little opportunity to calculate
osely. With numerical values, however, the person un-
ır with problems of vitamin assay almost always leans the
weight of a decision upon these figures. Such dependence and
s misplaced, largely because humanity has too great a re-
or figures per se.

sistency would require that a generalized table minus all
rs accompany these remarks. Unfortunately, nobody would
t such a table when figures were to be had in other works.
ı table, found in previous editions, is in fact deleted. In
to modern styles in vitamin tables, we can do no more than
gainst their unfair use in evaluating either a single food or a
diet.

NUMERICAL VALUES FOR THE VITAMIN CONTENT OF COMMON FOODS-

The data herein assembled comes from many sources chief of which are

Boas-Fixsen, M. A. B. and Roscoe, M. H.: Tables of Vitamin Content of Human and Animal Foods. Nutr. Abstr. and Rev. **7**, 823, 1938; **9** [illegible]

Booher, L. E., and Hartzler, E. R.: The Vitamin B_1 Content of Foods in terms of Crystalline Thiamine, U.S. Dept. Agric., Tech. Bull. No. 7[illegible], Washington, 1939.

Booher, L. E., Hartzler, E. R., and Hewston, E. M.: A Compilation of the Vitamin Values of Foods in Relation to Processing and Other Variants, U.S. Dept. Agric., Circ. No. 638, Washington, 1942.

Booher, L. E., and Marsh, R. L.: The Vitamin A Values of 128 Foods as Determined by the Rat Growth Method, U.S. Dept. Agric., Tech. Bull. No. 802, Washington, 1941.

Cheldelin, V. H., and Williams, R. J.: The Vitamin B Content of Foods, Univ. Texas Publications, No. 4237, 1942.

Dann, W. J. and Handler, P.: The Nicotinic Acid Content of Meat, Jour. Nutr. **24**, 153, 1942.

Emmerie, A., and Engel, C.: The Vitamin E Content of Foods, Ztschr. Vitaminforsch. **13**, 259, 1943.

Jukes, T. H.: Distribution of Pantothenic Acid in Certain Products of Natural Origin, Jour. Nutr. **21**, 193, 1941.

McVicar, R. W. and Berryman, G. H.: Nicotinic Acid in Foods, Jour. Nutr. **24**, 235, 1942.

Munsell, H. E.: Vitamins and Their Occurrence in Foods, The Milbank Memorial Fund Quarterly **18**, 311, 1940.

————The Riboflavin Content of Some Common Foods, Food Research **7**, 85, 1942.

————The Vitamin A, Vitamin B_1 (Thiamine), Vitamin C (Ascorbic Acid), and Riboflavin Content of Common Foods, The Milbank Fund Quarterly **21**, 102, 1943.

Neilands, J. B., Strong, F. M., and Elvehjem, C. A.: The Vitamin Content of Canned Fish Products, Jour. Nutr. **34**, 633, 1947.

Russell, W. C., Taylor, M. W., and Beuk, J. F.: The Nicotinic Acid Content of Common Fruits and Vegetables as Prepared for Human Consumption, Jour. Nutr. **25**, 275, 1943.

Sullivan, R. A., Bloom, E., and Jarmol, J.: The Value of Dairy Products in Nutrition, Jour. Nutr. **25**, 466, 1943.

Teply, L. J., Strong, F. M., and Elvehjem, C. A.: The Distribution of Nicotinic Acid in Foods, Jour. Nutr. **23**, 417, 1942.

Thompson, M. L., Cunningham, E., Snell, E. E.: Nutritive Value of Canned Foods in Riboflavin and Pantothenic Acid, Jour. Nutr. **28**, 123, 1944.

Tables of Food Composition in Terms of Eleven Nutrients. U. S. Dept. Agric., Misc. Publ. No. 572, 1945.

ssible Use of Tabulated Data.—There is no scientific justifi- r listing the day's menu, calculating the vitamin content. bles, and adding the figures together to obtain the total The values shown in the table should be employed in judg- ther or not a given food contributes a significant amount ic vitamins to the diet. The table also permits intelligent of suitable sources of the desired vitamins. The variability samples of the same food frequently is marked. Milk, for , has been found to vary from 100 to 400 I.U. of vitamin A grams and butter from less than 1000 to more than 6000 I.U. be stressed that the figures shown in the tables are rep- tive rather than averaged values.

ing from the extensive review of Munsell, "It is desirable a set of values showing the quantities of the various vita- different foods. In the general discussion of food sources of amins it was made clear that no food has a fixed and in- e content of any vitamin. Values for different samples of od may vary over wide ranges depending upon the factors fluence the content of the vitamins it contains." For prac- lietetic purposes an intelligent selection of representative becomes necessary. "Some values in the table may differ aly from corresponding ones in other summaries. Too much n should not be felt over such discrepancies, perhaps, since ues of this kind are, as explained, arbitrarily selected and their ximation to actual fact is problematical in any case."

ABLE 77. **Occurrence of Fat-soluble Vitamins in Some Foods.**
(Estimated per 100 grams moist weight.)*

Food items.	*Vitamin A (I.U.)*	*Vitamin D (I.U.)*	*Vitamin E (mg.)*	*Vitamin K*
leaf meal, dry	8000			xx
ls	0–75			
	50–90			
e, canned	60			
s	2790–4000			
ed	1350			
l	5000–7430			
kes, globe	200–390			
gus, green	700–1400			
hed	0–50			
ed	600			
ed	960			
os	100–290			
	0			
shoots	22			
	300–430			
powder	750			
	0		3.2–5.2	

cellent xxx, Good xx, Fair x.

(Estimated per 100 grams moist weight.)*

Food items.	*Vitamin A (I.U.)*	*Vitamin D (I.U.)*	*Vitamin E (mg.)*	*Vitamin K*
Beans, green, cooked:				
Kidney	900			
Lima	280			
Canned	130			
Snap	630-2000			
Canned	410			
Soy	200-350			
Wax	350			
Beans, dried, cooked:				
Kidney	0		1.2	
Lima	0-100			
Navy	0		4.0	
Soy	100			xxx
Baked with tomato	70			
Beef, lean	20		x	Trace
Beet tops	6700-21,000	Nil		xx
Beets	0-20		0.2	
Blackberries	75-150			
Black currants	400			
Black-eye peas—*see* Cowpeas				
Blueberries	50-280			
Brazil nuts	10			
Bread, "brown"	0		2.1	
White	0		1.4	
Fortified		x		
Broccoli, entire plant	9000	Nil	xx	xx
Cooked, flowers	3000-5000			
leaves	7300-16,000			
stem	1000			
Brussels Sprouts, cooked	400-640		1.7	x
Butter, average	3300	80	2.1-3.3	Nil
summer	up to 20,000	150		
Butter, goat's	900			
Cabbage:				
Young, partly green	150			x
Green, cooked	80-170			
Mature, white	0		0.7	
Red	40		0.2	
Dehydrated, unsulfited	520			
Cantaloupe	300-3400			
Carrot tops	xxx	Nil	xx	xxx
Carrots, cooked	10,000-12,000		1.5	
Canned	12,000			
Dehydrated	117,000			
Cauliflower	30-90			xx
Celery cabbage	9000			
Celery, green	1000		2.6	
Bleached	0-10			
Chard	2800-14,500	Nil	xx	xx
Cheese:				
Camembert	3610			
Cheddar	1200-2000			
Canned	1260			
Cottage, skim milk	60-175			
Cream	2000-2210			
Kraft, Amer.	2160			
Eng.	3070			
Parmesan	900			
Roquefort	2500-4000			
Swiss	1970-2700			
20% fat			0.6	
10% fat			0.3	

* Excellent xxx, Good xx, Fair x.

(Estimated per 100 grams moist weight.)*

Food items.	*Vitamin A (I.U.)*	*Vitamin D (I.U.)*	*Vitamin E (mg.)*	*Vitamin K*
. . .	15 800, av. 150			
ts, fresh	80			
	0			
s	Trace			
carne, plain, canned	160			
	500			
, milk	480			
ned	36			
tened	60			
. . . .	14 200			
wder, breakfast type	26		3 1	
n fat	17			
; .			12 5	
, dry	0			
oil .		Nil	3 0	
	0	52		Nil
oil	85,000†	8500†	0	Nil
	7000 12,200			
eet, white	0 50			
ow . . .	390 600			
anned	200			
ied . .	330 550		10.0	
al, white . .	0			
w, degerminated	300			
ole	510 750			
, refined . .	0	0	104–110	Nil
eed oil, refined	0	0	83–92	Nil
s	0 30			
rries . .	20 70			
e, canned	30			
drated . .	660			
20%	600 830	Traces		
mer . . .	1640			
bers, pared .	0 Trace			
skin . .	260			
ts, black	400			
	120			
lion greens	9000–13,650	Nil	xx	xx
cured:				
rocessed, Deglet Noor .	0			
essed, Saidy	350			
leaves	14,000	Nil	xx	xx
. . .	660-18,500	474		
whole, fresh	1140		3.0	
ried	4460			
k, fresh	3210	Trace-xx	x	x
ummer	3760			
Winter	1880			
te, fresh	0	Nil		
lant	30–100			
ve, escarole	10,000-15,000	Nil	2 0	xx
ench chicory	4000		0 2	
a	0			
fresh	10 50			
ed	60 115			
liver oils	xxx	xxx	0	0
r:				
ve . .	0			
y, low fat	70			
med. fat	110			
full fat	140			
heat	0			

† Consult label on product.

(Estimated per 100 grams moist weight.)*

Food items.	*Vitamin A (I.U.)*	*Vitamin D (I.U.)*	*Vitamin E (mg.)*	*Vitamin K*
Flour: Wheat 70% extraction	0		1.7	
82% extraction	0		2.7	
Whole-grain	0		1.2-3.4	
Germ	0		27.0	
Gooseberries	380			
Grapefruit	0-20			
Grapes	0-80			
Green vegetables	xx	Nil		xx
Leafy	xxx	Nil	xx	xxx
Guavas	200			
Hazelnuts	100			
Heart, fresh	0-200			
Herring, fresh		xx		Nil
Canned	98-210			
Hominy	0			
Honey	0			
Honey dew melon	50			
Ice cream, plain	540			
Kale	7500-20,000	Nil	8	xxx
Kidney, beef, cooked	1150			
Kippers		xx		Nil
Kohlrabi	2500			
Lamb, lean	0-Trace			
Lambsquarters	19,000			
Lard	0-5	0	0	
Leeks	1000		1.9	
Lemons	0			
Lentils, dry, cooked	50			
Lettuce, headed	540			
all others, aver.	1620			
green	4000-5000			
bleached	100		0.6	
Romaine or cos	1000			
Limes	0			
Liver, fresh	19,200-30,000	15-45		x
Mackerel, canned	175-215	xx	165-250	Nil
Mango	1000-1500			
Margarine, with added A	3300	x	x	
Marmalade, orange	5			
Marrow, vegetable	30			
Milk, breast		3		
After use of vitamin D milk		6		
Milk, cow's:				
Whole, fresh, aver. market	120	2	Trace	
From cows on dry feed	60	1		
From cows on pasture	180	3		
Canned, evaporated	400	3		
Irradiated		28+		
Fortified, pasteurized		40+		
Irradiated, pasteurized		14+		
Metabolized (yeast), certified		40+		
Dried, average	960	16		
From cows on dry feed	480	8		
From cows on pasture	1440	24		
Skim	10			
Dried	20			
Molasses	0			
Multi-Purpose Food	1667	133		
Mushrooms	0			
Grown in dark		21		
Grown in light		63		
Muskmelons	2400			
Mustard greens	6400-11,000	Nil	xx	xx

* Excellent xxx, Good xx, Fair x.

(Estimated per 100 grams moist weight.)*

Food items.	Vitamin A (I.U.)	Vitamin D (I.U.)	Vitamin E (mg.)	Vitamin K
	2800			
g	200			
	0		2	
	400-2400			
	20	Nil	3 8	
	0			
en	200			
	125			
een	5000		0 2	
	0 50			
ated	20			
	190			
	100			
	140 210	5		
	2500-3000			
	5000-30,000	Nil	5.5	x
cooked	0			
white	5-100			
	880-2000			
d	3000-3250			
d	450			
il	0	Nil	xxx	
roasted	0		26-36	
	10 30			
d	Trace			
, dehydrated	220		6	x
sh, cooked	680			
green	530			
split	370			
	50 400			
green	3000			
	2000			
ons	2600			
cucumber	190			
le	150			
	125			
ed	100			
	350			
	500			
	0			
	80			
chips	20 40		0.1	
s	1500			
fresh	1600-2500			
d	230			
ed	1200-3400			
in, cooked	3400			
ned	30			
	0			
s	0			
rries, black	130		110	
	xxx			
alm oil	100		0.4	
rb	0			
white	2000			
	0			
agas, white	25		2.2-3.5	
ow	0			
	60	500		
n, Canned	30	225		
um	750	275		
nook	100	625		
k	325	800		
d				
nes, canned in oil, drained	290	250-333		
ds				

(Estimated per 100 grams moist weight.)*

Food items.	Vitamin A (I.U.)	Vitamin D (I.U.)	Vitamin E (mg.)	Vitamin K
Sardines, canned in oil, total contents	710	333		
Sauerkraut, canned	Trace			
Scallops	0			
Shrimp, canned	60	xx		
Soya oil			92–120	xx
Soybean sprouts	170			
Spinach	8400–25,000	Nil	1.7	xxx
Canned	6790			
Squash, summer	250–1000			
Winter	4000–6000			
Strawberries	60			
Succotash	400			
Suet, beef	600			
Sugar	0			
Sweet potatoes	3500–7700			
Dehydrated	21,900			
Swordfish, fresh	1595			
Tangerines	300–420			
Tomato, mature, green	800			xx
ripe	1000			x
Ketchup	270–1880			
Pureé	1880			
Tuna fish, canned, drained solids	70	<100–333		
Tuna fish, canned, total contents	130	<100–333		
Turnip greens	10,000–20,000	Nil	xx	xx
Turnips, white	0		0.02	
Yellow	20			
Walnuts, black	70			
English	50			
Watercress	4000			
Watermelon	50			
Wheat	0			
Wheat germ	0			
Wheat germ oil, crude			150–420	
medicinal			320	
Yeast	0			

* Excellent xxx, Good xx, Fair x.

TABLE 78.—Representative Values for the Chief Water-Soluble Vitamins in Some Foods.

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	Thiamine (Micrograms)	Riboflavin (Micrograms)	Nicotinic Acid (Milligrams)	Ascorbic Acid (Milligrams)
Almonds	255	300–670	5	0
Apples	45	10–50	0	1.5–20 (av. 5
Apple juice	20	30	0	3
Pie	27	32	0	4
Applesauce, canned	10	10	0	1
Apple nuggets, dry	50	80	Trace	11
Apricots, fresh	30–45	40–75	<1	4–11
Canned	20	24	Trace	4
Dried, sulfured	10	160	3	12
Unsulfured	90	100		2
Arrowroot		60		
Artichokes, globe	75–180	30		10
Jerusalem	60–150			6

* Excellent xxx, Good xx, Fair x.

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	*Thiamine*	*Riboflavin*	*Nicotinic Acid*	*Ascorbic Acid*
	Micrograms		*Milligrams*	
green	180–210	120	1	35
d	60	90	1	15
	150–180	x		32
d		60		
	90–120	90–150	1	10–16
n	270	150	2	0
fat	420	100	2	0
	260	100	1.5	0
hoots	54	x	0	6
wder		300		2.5
	50–90	60–75	<1	10
	500	120		
	120	80	3	0
ap:				
	80	100	<1	19–25
ed	30	50	Trace	4
	75	100		25
elled, green:				
	210	95	<1	28
	250–300	140–175	1	32
ned	30	50	<1	8
	470	300	1	30–40
ried:				
y, navy	450–600	240–325	2	0
	525	750		0
	1140–1200	310–750	2	0
routs	100	120	1	14
aked	120	100	1	0
ned	50	50	<1	
New England style		54		
With tomato sauce		24		4
up, dehydrated	460	220	2.4	1
esh:				
k	120	150	5.0	0
burger	100	130	4.3	0
steaks	100	130	4.6	0
oast, steaks	110	140	4.7	0
d steak	120	150	5.2	0
p	100	120	4.2	0
meat	130	160	5.5	0
meat	100	120	4.3	0
gue, med. fat	220	270	5.0	0
rocessed:				
ed, med. fat	50	100	1.7	0
anned	20	190	2.7	0
ash, canned[1]	20	130	2.4	0
ash, canned[2]	40	110	2.5	6
d, chipped	110	220	3.7	0
t, canned	20	240	4.5	0
f and gravy	90	190	2.7	
li con carne, plain, canned	10	100	2.1	0
w, canned[3]	40	120	2.4	0
ops	50	170–300	0.3	34–50
canned	10	30	0.1	5
berries	30–45	60		10
currants	30	140		150
eyed peas—*see* Cowpeas				
rries	30–45	70	0.3	10–15
sh	x	200		0
gna	310	300	3.0	0

ont. 72% beef, 28% potatoes.

ont. 50% meat, 48% potatoes, 2% onions.

ont. 50% meat, 15% potatoes, 15% carrots, 8% dry beans, 12% tomato puree.

(Estimated per 100 grams or 100 cc. of moist weight)*

Food items.	*Thiamine* *Micrograms*	*Riboflavin* *Micrograms*	*Nicotinic Acid* *Milligrams*	[illegible]
Bouillon cubes	30	83	0 6[4] up to 27[5]	[illegible]
Brazil nuts	500-1100	70		[illegible]
Bread:				
Rye, light	160	40	1 1	[illegible]
White	45 90	50 90	1	[illegible]
Enriched	240-400	150-350	2-3	[illegible]
Whole wheat	225-450 (av. 280)	140-180 (av. 150)	3 5	[illegible]
Broccoli, entire plant	130	250	0 9	[illegible]
Cooked				22
Flowers	135	240		[illegible]
Leaves	135	450		[illegible]
Stems	75			
Brussels sprouts	110-180	60-75	0 3	[illegible]
Buckwheat	450		4	[illegible]
Butter	0-120	10-37	0.1	[illegible]
Buttermilk, cultured	40	180	0.1	[illegible]
Butternuts	xx			[illegible]
Cabbage:				
Young, partly green	30	50		[illegible]
Mature, bleached	30	25	0.5	[illegible]
Red				60
Green, boiled 10 min.				40
" 15 "				29
" 30 "				22
" 60 "				15
" 90 "				5
" 120 "				1 5
Dehydrated[6]	410	370	2.4	189
Cake, light batter	30 55	100-150	0.7	0
Candy, average	80	140	4	0
Cantaloupe	50-60	40-75	0 8	30 42
Carp		40		
Carrot juice				4
Carrots	60-70	60	0.5	6-10
Canned	30	20	0 3	2
Dehydrated	290	280	3 2	11
Cashew nuts	150	190		0
Cauliflower	100-150	105-130	0.6	69 75
Cooked	90			50
Celery	30	40	0 3	5 7
Bleached		35		
Green		100		
Celery cabbage	30	45		45
Cereals, prepared—refer to package label.				
Chard	60	130	0 2	38
Cheese:				
Amer., processed, canned	30	430	0 1	0
Camembert		830	1 6	
Chantelle		470	Trace	
Cheddar	24-40	500-550	0 2	0
Cottage	20	290	0 1	0
Cream	10	140	0 1	0
Parmisello		710	0 1	0
Processed (Old English)		570	Trace	0
Roquefort	30	450	1 2	0
Swiss	30	370	Trace	0
Velveeta		550	0 1	0

* Excellent xxx, Good xx, Fair x.
[4] vegetable extract.
[5] meat extracts.
[6] If sulfited, thiamine value appreciably lowered, ascorbic acid about [illegible]

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	*Thiamine*	*Riboflavin*	*Nicotinic Acid*	*Ascorbic Acid*
	Micrograms		*Milligrams*	
	50	40		10
	30	20	0 2	3
fresh	240-270	x	1	6
	90-150 (av. 110)	70-260 (av. 180)	8.6	4
anned	10	150	3.7	2
s	350	150	1.4	2
carne, plain, canned	10	100	2.1	0
	120			70
, milk	50	290		0
ed	14			
tened	42	240	1.1	
	20	120	1	30
eakfast type	67	390	2	0
at	75	390	2	0
ge, made with milk	75	230		0.9
, fresh	30-60	100	<1	
	Trace	Trace	Trace	0
	40-90	50	2.3	2
	xxx	xxx		
	270			
oil	0	0	0	0
	900	70	10	0
			<1	
ge	80-220	200-300	0.8	60-100
plain	40	40	0.5	0
eet, white or yellow	150	60-140	1.4	12
d	20	50	0.8	5
	300	x		0
eals—refer to package label.				
al, white, degerminated	160	90	0 9	0
e-grain	410	120	1.7	0
al, yellow, degerminated	150	60	0.9	0
e-grain	450	170	2.1	0
rch	0	0	0	0
rup	0	10	0.1	0
eed oil	0	0	0	0
s, fresh				6
d	500-830	230-300	2.2	2
at	90-140	350	3	13
r meal	70	0	0.6	0
rs, Graham	300	120	1.5	0
	100	30	<1	0
rries	30	x		15
d	190	180	0.9	33
rry sauce, canned		40		
, 20%	30	140	0.1	1
pie	30	80	0.2	0
ber pickles	10	20	Trace	7
bers	30-40	25-90	0.2	8
its, black	30	140		150
	45			45
lion greens	190	140	0.8	35-100
, cured	75	45-100	2	Trace
nuts	280	220	2	0
	360	230	3	8
		60		
en's:				
ole, fresh	120-150	340	0.1	0
ried	350	1230	0.2	0
ite	0-Trace	.250		0
k, fresh	320	520		0
lant	45-70	30-60	0.8	5-10
berries				10

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	*Thiamine*	*Riboflavin*	*Nicotinic Acid*	*Ascorbic Acid*
	Micrograms		*Milligrams*	
Endive, escarole	50–84	120–200		[illegible]
French	75	60		[illegible]
Farina	60	60	1	[illegible]
Enriched	370–530	260–270	1.3	[illegible]
Fig bars	20	60	0.9	[illegible]
Figs, fresh	60–75	5–45	<1	[illegible]
Dried	66	75	2	[illegible]
Fish, aver. lean	90–180			
Med. fat	70	70	4.2	[illegible]
Flour:				
Buckwheat, light	310	80	2.1	0
Whole-grain	610	160	4.2	0
Rye, light	150	70	0.9	0
Whole-grain	470	210	1.7	0
Soy, low fat	1100	350	2.9	0
Med. fat	820	340	2.6	0
Full fat	770	280	2.2	0
Wheat, patent	70	30	0.8	[illegible]
Enriched, min.	440	260	3.5	0
Enriched, max.	550	330	4.4	0
Wheat, peeled	580			
Self-rising	20	20	0.7	0
Enriched	440	260	3.5	0
Stone-ground	480			
Stone-ground, white	270–330			
Whole	560	120	5.6	0
Frankfurters	190	230	2.4	0
Fruit cocktail, canned	10	10	0.4	2
Garden cress	90			
Garlic	150	4		14
Goose	150	xx	3	xx
Gooseberries	150			25
Grapefruit	40–72	20–40	0.2	43
Juice	50–75	30		41–45
Canned	30	19	0.2	35
Segments, canned	30	21	0.2	30
Grapes	45–50	15–40	0.4	4
Juice	30	30	0	2–6
Dried, unsulfured	150	80	0.5	Trace
Guavas	45–150	10–90	1	75–250
Haddock	15–120	160	1	0
Halibut	90–120	180	6	0
Ham, fresh	960	190	4.1	0
Smoked	780	190	3.8	0
Ham and eggs, canned[7]	160	240	1.7	0
Hash—*see* Beef, corned				
Hazelnuts (filberts)	400–660	xx		0
Heart, fresh:				
Beef	600	900	6.8	14
Lamb	600			
Pork	540		8	
Herring	120	310	4	0
Hickory nuts	600	xx		0
Hominy, white	150–180	50–60	0.9	0
Honey	0–6	0–40	0.2	0–4
Horseradish	70			[illegible]
Huckleberries				40
Ice cream, plain	24–40	150–190	0.1	Trace
Jams	20	20	0.2	6
Jellies	20	20	0.2	4
Kale	120–190	350–500	0.8	[illegible]
Ketchup, tomato	120	70	2	[illegible]

[7] 50% each.

* Excellent xxx, Good xx, Fair x.

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	Thiamine (Micrograms)	Riboflavin (Micrograms)	Nicotinic Acid (Milligrams)	Ascorbic Acid (Milligrams)
eal	250	2100	10	11
	300	2000		
	500	2100		
t	210	260	5.9	0
roast	180	230	5.2	0
hops	210	260	5.9	0
tters	x	x		85
	0	0	0	0
	80–150	x		15–20
	8			5
	40–60	5	0.1	45
	30	Trace		45
ried	500	315–400	3	0
eaded	60–75	45–70	0.2	8
er	60–75	70–150	0.2	18
	30–60	5	0.1	27–37
esh	270–400	2500–3300	16.1	31
ge	170	1120	4.6	0
	150	130		5
rries	33			35
				2
n meat, canned	290	210	2.7	9
ni	130	80	2.1	0
el, Atlantic	58	200	5.8	0
c	26	330	8.7	
	xxx	xxx		
	60–90	50–100		25–60
ine	0	0–6	0	0
lade, orange	20	20	0	7
, vegetable	30–60			11
naise	40	40	0	0
, honey dew	46		0	21
aloupe	60	40–75	0.8	33–42
ow's:				
le, fresh, aver. market	42	195	0.1	Raw 2.2 Past. 1.3
rom cows on dry feed	42	160		
rom cows on pasture	42	210		
le, condensed	50	390	0.2	1
vaporated	50	360	0.2	1
Dried	300	1500	0.7	6
n, fresh	45	200	0.1	1
Dried	350	1960	1.1	7
miscellaneous:				
termilk, cultured	40	180	0.1	1
colate flavored	30–40	160–180	0.1	<1
at	60	40–80		1.5
man	15–20	16–52	0.2	6
eses	0–80	0–160	2.8–4	0
-Purpose Food	400	670	4	
rooms	60–120	5–500	6	1–8
ard greens	90–140	200–370	0.8	100–180
arines	72			25
dles, egg	180	110	2.1	0
meal	540–810	100–150	1.1	0
	120	100	0.7	20–30
s green	8	x	0	0
pe	6	0		0
ns, green				20–30
ature	30	20–60	0.1	9–15
ehydrated	230	150	1.1	37
ges	80	30–60	0.2	49

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	*Thiamine*	*Riboflavin*	*Nicotinic Acid*	*Ascorbic Acid*
	Micrograms		*Milligrams*	
Orange Juice	70	15		[illegible]
Canned	70	20	0 2	[illegible]
Oysters, solids and liquor	180–300	230–460	1 2	[illegible]
Papaya	50-75	150-180		[illegible]
Parsley	80	300		[illegible]
Parsnips	80–120	90	0 2	[illegible]
Peaches	20-40	50-60	0 9	[illegible]
Canned	10	20	0 7	4
Dried, sulfited	10	200	5 4	[illegible]
Peanut butter	200-300	160–320	16 2	[illegible]
Peanuts, roasted	300-400[8]	160–500	16 2	[illegible]
Pears	20-45	20–75	0 1	4 7
Canned	10	20	0 1	2
Pea soup, dehydrated	620	210	3 1	2
Peas, green	400	200	2 1	25
Canned	110	60	0 9	8
Split	870	290	3 0	2
Pecans	500	300	0 9	2
Peppers, green	30-70	40–100	0 4	120-180
Red	30–70			150
Persimmons	0			100
Pickles, cucumber	10	20	Trace	7
Pineapple	80-90	5-55	0 2	24-38
Canned	70	20	0 2	9
Juice, fresh	65			25
Canned	50			9 15
Plums	50-150	30–45	0 6	5 7
Canned (Italian prunes)	30	30	0 4	1
Pomegranate juice		100		7
Popcorn, popped	x	x	1	0
Pork:				
Bacon—*see* separate entry.				
Boston butt	1050	210	4.5	0
Ham—*see* separate entry.				
Lean cuts, misc.	920	180	3 9	
Loin	1040	200	4 4	
Picnic	940	180	4.0	
Pork and gravy, canned	190	240	2 7	
Sausage	220	150	2 3	
Bulk, canned	190	210	2 8	
Salt, fat	180	40	0 9	
Spareribs	920	180	3 9	
Potato chips	350	210		15
Potatoes, aver.	100	40	1 2	10
New				16
Stored, old				5
Newly dehydrated	250	100	4 8	26
Prunes, fresh	50			
Dried, unsulfited	100-180	160	1 7	Trace
Pumpkin	50	80	<1	3 10
Canned	20	60	0 5	0
Quince				9 12
Rabbit	90	60	7	4
Radishes	40-60	30-40	0.1	25
Raisins, unsulfited	150	80	0 5	Trace
Raspberries	20-30	70	0 3	[illegible]
Juice	20			20
Rhubarb	10 25	30	0.1	15 [illegible]
Cooked				[illegible]
Rice, brown	290	50	4 6	0
Converted	230	40	3 8	
White	50	30	1 4	

* Excellent xxx, Good xx, Fair x.

[8] Tested without skins, with skins higher.

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	*Thiamin* (*Micrograms*)	*Riboflavin* (*Micrograms*)	*Nicotinic Acid* (*Milligrams*)	*Ascorbic Acid* (*Milligrams*)
	1000	100		5
in, enriched	240	150	2.	0
et, not enriched	80	130	0.8	
s	60-75	60-100	0.5	36-45
	500	140		
	30-120	160-220	7.4	9
l	30	160-180	6.5	0
				7
Atlantic, canned in oil, l solids	15	190	4.8	0
Pacific, canned in oil, d solids	7	300	7.4	
, Pacific, in tomato juice	10	330	5.8	
ut, canned	30	200	0.2	8-18
	xx	x	1	3
Wheat	200	140	4.2	0
	90	160	1	3
d	10	30	1.9	0
e Beans and Flour.				
ti with meat, canned	20	120	2.2	
ti	130	80	2.1	0
	50-120	240-300	0.7	59-75
ed	20	80	0.3	14
summer	40	50	1.1	17
er	50	80	0.6	8
erries	30	70	0.3	60
sh	90	100		8
	0	0	0	0
potatoes	100-140	60-75	0.7	22-33
ydrated	180	140	1.9	34
fish	53	49	9.1	
table	0	10	0.1	0
rines	70-120	20-30	0.2	30-48
	90	xx		10
	0	350	7	0
erage			<1	
o catsup	90	70	2.2	11
e	90	70	1.8	28
oes, fresh	60-80	40-60	0.6	23
en (mature)	70	45		13-30
	75	60		13-30
ned and juice	50-80	40-45	0.7	7-29
e, fresh, med. fat	220	270	5	0
	6	120	3	
fish, canned, drained solids	40	130	10.6	0
fish, canned, total contents	40	110	9.2	0
y	120-150	190-240	7.9	
greens	100	350-560	0.8	100-140
s	60	60	0.5	30
ked				18
ps, loin	180	270	6.3	0
et, round	180	280	6.4	
st or steak, leg	170	270	6.3	
meat	170	260	6.0	
sausage, canned	70	140	3.1	0
ts, black	330			
lish	480	130	1.2	3
ress	120	250	1	60-75
melon	30-60	15-50	0.2	6
see also Flour.				
le-grain, uncooked	450	130	4.6	0
	370-520	350-600	32	0
n	2050-3500	480-1500 (av. 800)	4.6-7	0

(Estimated per 100 grams or 100 cc. of moist weight.)*

Food items.	*Thiamine*	*Riboflavin*	*Nicotinic Acid*	[illegible]
	Micrograms		*Mill*[illegible]	
Whey, dried	1100	5900		
Whitefish	90	xx		5
Yeast, compressed baker's	450	2070	28.2	[illegible]
Dried, brewer's	9690	5450	36.2	

* Excellent xxx, Good xx, Fair x.

Table 79.—Occurrence of Minor Members of the Vitamin B Complex in Some Foods.

(Estimated in micrograms per 100 grams of moist weight.)

Food items.	*Pyridoxine*	*Pantothenic Acid*	[illegible]
Apples	26	60	0 9
Apricots, canned		90	
Artichokes, Jerusalem		400	
Asparagus, canned:			
All green		165	
Bleached		105	
Bananas	320	70–180	4 4
Barley		1000	
Beans, green, canned		55	
Lima, green, canned		95	
Navy, canned:			
New England style		70	
With tomato sauce		85	
Dried	550	830	9 8
Beef brain		1800	
Heart	120	2000	
Liver	170	4000–7600	
Muscle	77	490	2 6
Beef, lean		1000	
Beets	110	110	2 7
Canned		66	
Bread, white		460	1 1
Whole wheat		570	1 9
Broccoli		1100–1400	
Buttermilk, churned		350–560 (av. 460)	
Cabbage	120	180	2 4
Carrots	120	200–250	2 5
Canned		115	
Cauliflower	20	920	17 0
Cheese	66	130–960	3 6
Chicken		530–620	5 4 9 8
Breast	130		
Leg	25		
Chocolate	23	190	32 0
Corn		310	5 8
Yellow, whole kernel, canned		180	
White, whole kernel, canned		160	
Cornmeal, white	54		
Cowpeas		1700–2000 (av. 1800)	
Egg, hen's	22	800–4800 (av. 2700)	9 0
Egg-yolk		5000–10,000 (av. 6300)	
Grapefruit	9	290	3 [illegible]
Canned, juice		100	
Segments		110	
Halibut	110	150	8 0
Lamb, leg	81	600	2 4

(Estimated in micrograms per 100 grams of moist weight.)

Food items.	Pyridoxine	Pantothenic Acid	Biotin
		110	3.1
		300	
canned:			
	210	310	3.0
	270	470	18.0
, whole	6	130–420 (av. 200)	5.0
		210–430 (av. 360)	
	50		
	270	260	9.1
ns	45	1700	16.0
houlder	18	4300	2.7
d		1100	
	80	70–340	1.9
anned		100	
	33	490	8.7
canned:			
one		35	
ne		45	
nned		19	
sh	79–190	380–1040	3.5
d		120	
	300	2100	18.0
roasted	300	2500	34.0
le. canned		85	
iscle		470–1100	2–4.6
	29–100	280–980	7.5
	19–170	340–660	4–6
	86–270		
s	220–320	320–650	0.6
		60	
n. canned		38	
n. canned		400	
	94	90	3.1
lished		400	
		1500–2700 (av. 2200)	
. canned	450	580–700	15.0
s. canned:			
ic	160	470	4.0
	280	600	24.0
tomato sauce	220	450	27.0
, dry pack		255	
pack		185	
s		1800	
	83	120–180	6.9
ed		45	
rries	44	260	4.0
ot		700	
es	60	100	4.0
ed		200–370 (av. 220)	
anned in oil	440	420	3.0
	110	37	2.1
	56–130	110–260	1.4–2
s, English		800	
whole		510–1100	5.2–7
		2000–3000 (av. 2400)	
	600–1750	700–850	
flour		300	0.7
dried	3600	20,000	
		140–350 (av. 300)	

TABLE 80. **Vitamin Content of Strained and Chopped Foods Prepared for Infant Feeding.**

Food items.	Vitamin A (I.U.)	Thiamine (γ)	Riboflavin (γ)	Niacin (mg.)	Ascorbic Acid (mg.)
	Value per 100 grams or 100 cc.				
Beech-Nut:					
JUNIOR FOODS:					
Beans, green	320	32	81	0.7	7.7
Beets	10	8	28	0.3	3.9
Carrots	5300	20	29	0.5	1.7
Chicken soup	640	35	38	0.5	0.8
Liver soup	1660	26	440	1.5	4.7
Pineapple rice pudding	118	32	57	0.3	1.6
Prunes	410	25	19	1.2	1.6
Raisin rice pudding	114	23	106	0.8	2.6
Spinach	3370	20	157	0.6	12.1
Vegetable and beef	900				
Vegetable and lamb	1750	12	85	0.4	1.4
Vegetable soup	1380	20	20	0.5	0.8
Vegetables with bacon	1033	35	40	0.8	0.8
STRAINED FOODS:					
Apple and apricot	400	19	13	1.1	0.4
Apple sauce	63	17	7	0.5	0.9
Beans, green	290	22	99	0.8	2.5
Beets	4	9	50	0.3	4.9
Carrots	10280	18	16	0.6	2.7
Chicken soup	500	42	50	0.6	0
Custard pudding	198	12	129	0.2	0.5
Liver soup	2240	22	430	1.2	3.5
Peaches	350	15	12	0.6	3.3
Pears	43	11	15	0.3	0.5
Peas	280	73	76	1.1	9.2
Pineapple pudding	88	30	55	0.6	0.3
Prunes	520	19	51	0.4	1.8
Spinach	2860	10	108	0.6	9.9
Squash	2540	18	63	0.2	2.9
Tomatoes with milk	1520	32	200	0.4	2.8
Vegetable and beef	1960	15	30	1.0	0.9
Vegetable and lamb	1340	12	90	1.5	1.4
Vegetable soup	2480	30	21	0.6	0.7
Vegetables with bacon	1220	47	56	0.7	0.4
Campbell:					
STRAINED SOUPS					
Beef	1693	37	72	1.3	3.9
Chicken	1766	18	40	0.8	1.1
Lamb	1130	36	68	1.2	2.7
Liver	7000	80	62	1.5	7.3
Vegetable	2550	69	64	1.0	7.5
Clapp:					
Baby cereal		1000	300		
Baby oatmeal		1000	300		
JUNIOR FOODS					
Apple sauce	116	10	12	Trace	1.1
Apricots with farina	1633	29	20	0.3	1.1
Carrots	7866	27	13	0.4	2.2
Chicken soup	1350	40	28	0.5	1.1
Chocolate pudding	116	9	239	0.2	1.5
Fish chowder		45	54		
Peaches	366	16	14	1.0	1.0
Pears	167	2	32	Trace	1.1
Pineapple pudding	150	24	239	0.2	1.2
Prunes	466	24	25	0.8	4.7
Spinach	4400	41	93	0.2	6.3
Vegetable soup	6200	26	27	0.4	1.3

Food items.	Vitamin A (I.U.)	Thiamine (γ)	Riboflavin (γ)	Niacin (mg.)	Ascorbic Acid (mg.)
	Value per 100 grams or 100 cc.				
cont.)					
Foods (cont.)					
ables, creamed	2833	26	99	0.4	1.4
ables with bacon	7016	67	10	0.7	1.5
tables with beef	4366	18	48	0.7	1.7
tables with lamb	3416	39	34	0.7	2.0
tables with liver	4233	55	487	1.5	1.4
ED FOODS					
e sauce	116	9	10	Trace	1.1
cots and apples					
th farina		6			
ns, green	533	28	57	0.3	3.6
rots	8600	24	12	0.5	2.3
cken soup	1433	16	133	0.2	0.5
tard pudding	333	12	46	0.1	1.1
r soup	2833	43	470	1.6	1.7
hes	200	51	25	0.3	1.7
rs	167	1	29	Trace	1.4
s	600	89	69	1.1	9.1
eapple pudding	133	24	130	0.1	2.1
nes	450	163	29	0.7	3.2
ash	1083	35	75	0.5	5.6
etable soup	1333	25	71	0.4	2.0
getables, creamed	1033	23	128	0.4	1.5
etables, mixed	966	13	26	0.4	1.2
getables with bacon	5600	77	9	0.7	1.8
getables with beef	2000	16	86	0.5	0.3
getables with lamb	2966	30	43	0.6	2.0
OOKED CEREALS, DRY					
rley cereal		2000	500	8.4	
real food		1800	300	6.7	
rained oatmeal		2000	300	4.3	
PPED FOODS					
ple prune pudding	360	25	77	0.1	1.8
ans, green	640	42	77		5.6
rrots	15190	25	32	0.6	2.8
eats:					
Beef		15	217	7.1	
Liver		74	3440	14.7	
Veal		29	301	8.6	
aches	1575	7	25	0.8	2.5
neapple rice pudding	35	21	60	0.2	3.2
inach	4080	28	98	0.2	7.0
getable and beef	3000	32	46	0.5	1.4
getable and lamb	3510	35	46	0.4	2.5
getable and liver	2140	39	280	1.1	3.2
INED FOODS					
ple sauce	93	14	35	0.1	1
ricots with farina	4070	21	25	0.3	2.5
ans, green	605	32	74	0.5	5.6
ets	18	14	35	0.1	7.5
rrots	11620	25	42	0.6	3.5
ocolate custard	74	32	154	0.2	1
stard pudding	64	35	158	0.2	1
er soup	2680	60	469	2.0	5.2
ats:					
Beef		12	193	3.4	
Liver		65	2270	8.3	
Veal		38	311	6.1	
xed vegetables	5290	224	84	0.5	1.8
aches	950	18	39	0.5	2.5

Food items.	Vitamin A (I.U.)	Thiamine (γ)	Riboflavin (γ)	Niacin (mg.)	[illegible]
	Value per 100 grams or 100 cc.				
Gerber:					
STRAINED FOODS (cont.)					
Pears	64	14	32	0.3	[illegible]
Pear pineapple	64	25	21		[illegible]
Peas	565	98	66	0.9	[illegible]
Prunes	815	28	60	0.5	[illegible]
Spinach	3045	28	112	0.3	[illegible]
Squash	1720	25	66	2.5	[illegible]
Vegetable and lamb	2465	32	42	0.7	2.5
Vegetable soup	2805	49	96	0.3	[illegible]
Heinz:					
PRECOOKED CEREALS, DRY					
Cereal food		1200	880	22.8	
Oatmeal		1230	880	22.8	
JUNIOR FOODS					
Apple, fig and date dessert	22	18	43		2.5
Chicken farina vegetable porridge	370	110	110	1.2	1.7
Chopped carrots	4000	36	58	Trace	3.3
Chopped green beans	650	38	81		8.[illegible]
Chopped mixed vegetables	2000	27	55		1.8
Chopped spinach	4500	33	200		7.8
Creamed diced vegetables	2500	21	140	1.3	3.1
Creamed tomato and rice	1500	60	98		10.0
Pineapple rice pudding	38	27	70		0.8
Prune pudding	300	30	180		3.2
Vegetables with lamb and liver	2600	27	180	1.5	3.2
STRAINED FOODS					
Apple prune pudding	130	19	71		1.4
Apple sauce	32	Trace	14		2.5
Apricots and apple sauce	4100	21	45		2.0
Apricots with oatmeal	3100	39	17		3.5
Beans, green	1200	33	78	Trace	8.0
Beef and liver soup	5700	39	220	1.8	8.0
Beef broth with beef and barley	74	28	32	1.5	1.7
Beets	14	15	28	Trace	10.0
Carrots	6800	24	53		2.6
Custard pudding	55	16	100		2.0
Orange pudding	55	25	71		3.9
Peaches	740	12	Trace		2.7
Pears and pineapple	48	36	43		1.5
Pears with farina		16	13		0.7
Peas	1100	120	120	1.7	14.0
Prunes	800	42	140		9.0
Spinach	5400	27	170	Trace	8.8
Tomato juice	630	40	20	0.9	20.0
Tomato soup	2300	78	130	1.1	22.0
Vegetable and lamb	2700	17	30		0.7
Vegetable soup	1300	218	110		1.4
Libby:					
HOMOGENIZED FOODS					
Apples and apricots	1470	11	13	0.2	4.7
Apples and prunes	250	Trace	100	0.1	4.9
Apple sauce	62	10	13	0.1	4.6
Apricot-farina	2634	13	22	0.3	2.1
Beans, green	333	28	40	0.2	7.2
Beets	9	16	22	0.1	Nil
Carrots	7320	22	23	0.4	8.2
Custard pudding	425	Trace	141	<0.1	Nil
Fruits, mixed (apricots, peaches, pears)	933	11	13	0.5	2.6
Liver soup	5480	41	328	2.0	2.4

Food items.	Vitamin A (I.U.)	Thiamine (γ)	Riboflavin (γ)	Niacin (mg.)	Ascorbic Acid (mg.)
	Value per 100 grams or 100 cc.				
NIZED FOODS (cont.)					
nes	668	10	18	0.9	3.6
and pineapple	5	31	17	0.2	1.4
	417	73	43	0.9	3.6
es with pineapple and hon juices	775	19	103	0.6	8.9
ch	3570	11	65	0.2	17.0
ch	1562	13	42	0.4	4.9
table soup	2670	72	43	0.8	2.6
tables, garden (carrots, as, spinach)	5340	46	32	0.5	1.8
tables, mixed (green ans, pumpkin, tomato)	1200	20	26	0.2	5.1
tables with bacon	4301	38	22	0.6	2.4
tables with beef	4400	77	43	1.3	2.4
tables with lamb	1085	26	82	0.6	1.1
MEATS					
f		17	326	4.7	
rt		156	1067	4.4	
nb		42	287	5.3	
er		30	2200	7.1	
k		452	238	3.7	
l		52	350	6.3	
NED MEATS					
ef		10	242	3.2	
art		64	181	4.5	
mb		26	264	4.0	
ver		14	2000	4.4	
rk		346	278	4.7	
al		24	288	4.9	

SUGGESTIONS FOR SAVING VITAMINS.

her P. Daniel in "Vitamin Content of Foods" in the Yearbook ate No. 1681 of the U. S. Dept. of Agriculture, issued in 1940, mends the following practical suggestions for the preservation amin values in cooking and serving foods:

Don't stir air into foods while cooking.
Don't put them through a sieve while still hot.
Don't use soda in cooking green vegetables.
n boiling foods, raise the temperature to the boiling point as rapidly as possible.
Jse as little water as possible.
Don't use long cooking processes such as stewing when shorter methods are feasible.
Don't throw away the water in which vegetables have been cooked. Use it in making gravies, sauces, and soups.
Don't fry foods valuable for their content of vitamins A, B_1, or C.
Prepare chopped fruit and vegetable salads just before serving.
tart cooking frozen foods while they are still frozen.
erve raw frozen foods immediately after thawing."

litional suggestions are given by Munsell (1940):

Do not peel vegetables or fruits and cut them up and then let them stand before cooking. Cook them whole and with the outer covering on helps preserve vitamin content.
erve foods as soon as possible after they are cooked.
rying and roasting are very destructive of vitamins.
tore foods at low temperatures and in closed containers."

TABLE 81.—**Ascorbic Acid Content of Cooked and Canned Foods Compared with the Fresh Foods.***

Food items.	Raw.	Cooked. Solid.	Cooked. Liquid.	[illegible]
	Mg. per 100 g. or cc.			
Apples	10.0	7.0	...	Sauce, boiled [illegible]
	10.0	6.0	...	Sauce, boiled [illegible]
	10.0	3.1–3.3	...	Baked, open [illegible] hrs., 204° C.
	10.0	2.6–3.4	...	Baked, covered [illegible] 1½ hrs. 204° C.
	10.0	2.2	...	Baked in pie
Asparagus	12.0	8.2	...	Boiled
		0	...	Canned
		2.8	...	Canned, strained
Tips	45.0–165.4	21.4–35.7	1.1–2.2	Boiled
	45.0–165.4	10.0–14.4	10.6–17.1	Canned
White stems	8.0–25.6	10.1–17.1	1.1–2.2	Boiled
	8.0–25.6	10.3–13.7	10.6–17.1	Canned
Green stems	23.7–71.7	19.5–39.8	1.1–2.2	Boiled
	23.7–71.7	13.1–32.6	10.6–17.1	Canned
Beans, broad	27.7	7.8	8.9	Boiled
Beans, green stringless	9.0–13.5	1.8–3.4	2.5–6.2	Boiled
	9.0–13.5	4.1–4.2	5.5–5.6	Canned
Beets	21.8	20.1	...	Boiled 1 to 2 hours [illegible] rejected
	21.8	20.1		Boiled 1 to 2 hours [illegible] kept
		13.2–19.2	...	Canned
Beet greens	43.0	25.0	4.0	Boiled 2 min.
	43.0	16.0	7.0	Boiled 6 min.
	43.0, 37.0	16.0, 16.0	9.0, 7.0	Boiled 10 min. done [illegible]
	37.0	14.0	10.0	Boiled 14 min. overdone [illegible]
Broccoli	32.0	22.0	...	Boiled
Brussels sprouts	115.0	33.3–36.6	16.2–23.4	Boiled
	79.0	43.8	...	Boiled 30 to 40 min. [illegible] rejected
	79.0	77.3		Boiled 30 to 40 min. [illegible] kept
	123.0	66.0	...	Boiled 15 min.
	123.0	29.0	...	As above, then 2 hrs. [illegible] cooking box
	123.0	24.0	...	As above, then 6 hrs. [illegible] cooking box
	123.0	87.0	...	Steamed 15 min.
	123.0	29.0	...	As above, then 2 hrs. [illegible] cooking box
	123.0	18.0	...	As above, then 6 hrs. [illegible] cooking box
	123.0	64.0	...	Cooked in cooking [illegible] min.
	123.0	41.0	...	As above, then [illegible] 2 hrs. in cooking [illegible]
	123.0	33.0	...	As above, then [illegible] 6 hrs. in cooking [illegible]
	79.0	66.9	...	Cooked with [illegible] amount of water
Cabbage, *see also* page 818	15.0	12.0	...	Boiled
	22.0–30.0	11.0–16.0	0.9–1.2	Finely cut, [illegible]
	22.0–30.0	9.0–13.0	1.2–2.0	Finely cut, boiled [illegible]
		8.0–11.0	1.8–2.5	Finely cut, boiled [illegible]

* From Boas Fixsen, M. A.: Nutrition Abstracts and Reviews, 8, 299, 1938.

<table>
<tr><th></th><th>Raw.</th><th colspan="2">Cooked.</th><th>Method of treatment.</th></tr>
<tr><th></th><th></th><th>Solid.</th><th>Liquid.</th><th></th></tr>
<tr><th></th><th colspan="3">Mg. per 100 g. or cc.</th><th></th></tr>
<tr><td></td><td></td><td>7.0–9.0</td><td>2.2–3.1</td><td>Finely cut, boiled 9 min.</td></tr>
<tr><td></td><td></td><td>7.0–8.0</td><td>2.5–3.8</td><td>Finely cut, boiled 12 min.</td></tr>
<tr><td></td><td>18.0</td><td>10.3</td><td>...</td><td>Boiled 30 to 40 min., liquid rejected</td></tr>
<tr><td></td><td>18.0</td><td colspan="2">15.5</td><td>Boiled 30 to 40 min., liquid kept</td></tr>
<tr><td></td><td>18.0</td><td>0</td><td>...</td><td>Boiled 1 to 2 hrs., liquid rejected</td></tr>
<tr><td></td><td>18.0</td><td colspan="2">14.9</td><td>Boiled 1 to 2 hrs., liquid kept</td></tr>
<tr><td></td><td>57.3</td><td>32.7</td><td>...</td><td>Boiled 30 to 40 min., liquid rejected</td></tr>
<tr><td></td><td>57.3</td><td colspan="2">58.4</td><td>Boiled 30 to 40 min., liquid kept</td></tr>
<tr><td></td><td>57.3</td><td>40.9</td><td>...</td><td>Boiled 1 to 2 hrs., liquid rejected</td></tr>
<tr><td></td><td>57.3</td><td colspan="2">55.9</td><td>Boiled 1 to 2 hrs., liquid kept</td></tr>
<tr><td></td><td>56.7</td><td>12.9</td><td>...</td><td>Boiled 30 to 40 min., liquid rejected</td></tr>
<tr><td></td><td>56.7</td><td colspan="2">35.5</td><td>Boiled 30 to 40 min., liquid kept</td></tr>
<tr><td></td><td>56.7</td><td>9.6</td><td>...</td><td>Boiled 1 to 2 hrs., liquid rejected</td></tr>
<tr><td></td><td>56.7</td><td colspan="2">24.3</td><td>Boiled 1 to 2 hrs., liquid kept</td></tr>
<tr><td></td><td>1.2</td><td>3.6</td><td>...</td><td>Cooked</td></tr>
<tr><td></td><td>4.8–8.0</td><td>4.3–9.5</td><td>1.4–5.6</td><td>Cooked</td></tr>
<tr><td></td><td>4.8–8.0</td><td>3.1–4.1</td><td>3.9–4.7</td><td>Canned</td></tr>
<tr><td></td><td></td><td>0</td><td>...</td><td>Canned</td></tr>
<tr><td></td><td></td><td>2.5</td><td>...</td><td>Canned, strained</td></tr>
<tr><td></td><td>23.8</td><td>6.5</td><td>...</td><td>Boiled 30 to 40 min., liquid rejected</td></tr>
<tr><td></td><td>23.8</td><td colspan="2">26.6</td><td>Boiled 30 to 40 min., liquid kept</td></tr>
<tr><td></td><td>23.8</td><td>18.9</td><td>...</td><td>Cooked with minimum of water</td></tr>
<tr><td>l Anne</td><td>2.1</td><td>2.1</td><td>...</td><td>Canned</td></tr>
<tr><td></td><td>7.6</td><td>5.1</td><td>...</td><td>Boiled 12 min. on cob</td></tr>
<tr><td></td><td>9.0</td><td>8.0</td><td>...</td><td>Boiled 4 min., whole kernels</td></tr>
<tr><td></td><td>8.9</td><td>8.3</td><td>...</td><td>Boiled</td></tr>
<tr><td></td><td>8.2</td><td>7.6</td><td>...</td><td>Boiled</td></tr>
<tr><td></td><td>9.0</td><td>7.0</td><td>...</td><td>Home canned, cream style</td></tr>
<tr><td></td><td>9.0</td><td>8.0</td><td>...</td><td>Home canned, whole kernels</td></tr>
<tr><td></td><td>27.6–47.0</td><td colspan="2">17.8–28.5</td><td>Cooked</td></tr>
<tr><td></td><td>27.6–47.0</td><td>11.4–23.5</td><td>13.9–21.0</td><td>Canned</td></tr>
<tr><td>:e</td><td>...</td><td>...</td><td>45.0–50.0</td><td>Canned, sweetened, tested at once</td></tr>
<tr><td></td><td></td><td></td><td>39.0–46.0</td><td>Canned, sweetened, tested after 6 months</td></tr>
<tr><td></td><td></td><td></td><td>34.0–41.0</td><td>Canned, sweetened, tested after 12 months</td></tr>
<tr><td></td><td></td><td></td><td>45.0–54.0</td><td>Canned, unsweetened, tested at once</td></tr>
<tr><td></td><td></td><td></td><td>40.0–48.0</td><td>Canned, unsweetened, tested after 6 months</td></tr>
<tr><td></td><td></td><td></td><td>36.0–43.0</td><td>Canned, unsweetened, tested after 12 months</td></tr>
<tr><td>ms</td><td>5.0–6.5</td><td>2.4–4.4</td><td><1.0–2.9</td><td>Cooked</td></tr>
<tr><td></td><td>5.0–6.5</td><td>3.1–5.7</td><td>2.7–4.3</td><td>Canned</td></tr>
<tr><td></td><td>155.0</td><td>36.0</td><td></td><td>Chopped, boiled 25 min.</td></tr>
</table>

Food items.	Raw.	Cooked. Solid.	Cooked. Liquid.	Method of cooking
	Mg. per 100 g. or cc.			
Kale (cont.)	155.0	20.0	...	As above, then [illegible] cooking box
	155.0	14.0	...	As above, then [illegible] cooking box
	155.0	51.0	...	Chopped, [illegible]
	155.0	16.0	...	As above, then [illegible] cooking box
	155.0	11.0	...	As above, then [illegible] cooking box
Kohlrabi	37.6	8.9	...	Boiled 30 to [illegible] rejected
	37.6		26.7	Boiled 30 to 40 [illegible] kept
	37.6	35.8	...	Cooked in [illegible] amount of water
Loganberries	38.8–48.4	22.1–24.2	25.8–26.7	Boiled
	38.8–48.4	31.0–46.9	26.7–35.2	Canned
Onions	8.9	3.1	...	Boiled
	9.7	5.6	2.3	Boiled
Orange juice	50.0	...	29.4	Canned
Orange marmalade, much peel	...	7.0–14.0		
Little peel	...	6.0, 6.5		
No peel	...	<1.0		
Parsnips	3.7	6.1		
Peas	14.0	8.1		
	17.4	13.7	...	Boiled
	23.0–24.0	11.0–15.0	...	Boiled
	22.7–31.2	6.7–10.0	5.2–7.4	Boiled
	22.7–31.2	8.1–19.9	11.0–17.8	Canned
Pineapple	5.9	5.4	...	Canned
Pineapple juice	31.0	...	7.0	Canned
Plums, red	4.6	2.9	2.3	Boiled
	4.6	2.5	2.2	Canned
Potatoes, white	8.9, 9.9, 13.3	8.6, 9.5, 12.8	...	Boiled, peeled
	12.6, 13.3	14.9, 12.8	...	Boiled, 35 min., 95° [illegible] peeled
	12.6, 13.3	17.2, 14.1	...	Steamed 45 min., [illegible]
	5.8–9.5	4.1–5.9	...	Boiled, peeled
	5.8–9.5	4.4–6.7	...	Steamed, peeled
	5.8–9.5	4.8–7.9	...	Steamed, unpeeled
	13.0–27.0	14.0–16.0	...	Steamed 20 min., [illegible]
	13.0–27.0	10.0–14.0	...	Boiled 20 min., [illegible]
	13.0–27.0	7.0	...	As above, then 2 hrs. cooking box
	13.0–27.0	1.0–2.0	...	As above, then 6 hrs. cooking box
	12.6, 13.3	12.2, 11.5	...	Cooked in pressure [illegible]
	12.6, 13.3	22.0, 17.0	...	Greased and baked [illegible] 225° C.
	12.6, 13.3	6.8, 9.4	...	Cooked, then fried in [illegible]ter in slices
	12.6, 13.3	13.4, 11.8	...	Fried in butter in [illegible]
	13.3	13.7	...	Fried in Crisco in [illegible]
Potatoes, new	29.1–40.6	18.5–25.0	1.8–4.9	Boiled
	29.1–40.6	19.3–21.9	11.5–25.0	Canned
Potatoes, sweet	...	8.0–12.0	...	Cooked in skins
Raspberries	...	5.0–8.0	3.9–8.1	Canned
Rhubarb	11.7	3.2	...	Cooked
	11.7	1.6	...	Canned
Sauerkraut	8.8	2.3	...	Cooked in mini[illegible] amount of wa[illegible]
Spinach	18.0	13.0	...	Boiled

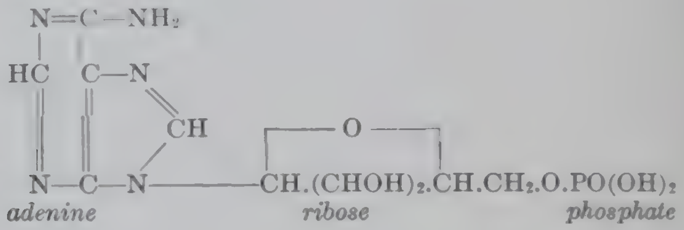
Raw.	Cooked. Solid.	Cooked. Liquid.	Method of treatment.
Mg. per 100 g. or cc.			
78.3	29.7	...	Boiled 30 to 40 min., liquid rejected
78.3	48.9		Boiled 30 to 40 min., liquid kept
32.0–46.9	12.1–23.7	12.1–21.4	Canned
3.1	4.1	...	Cooked
71.4	37.5	25.0	Boiled
71.4	35.7	20.8	Canned
64.6–77.5	40.8–55.4	16.3–18.4	Canned
17.0–22.0	14.0–21.0	...	Canned, tested after 24 hr.
17.0–22.0	7.0–18.0	...	Canned, tested after 6 months
	12.9–13.7	...	Strained
15.7	...	24.2	Canned
		5.4–23.0	Canned
35.0	18.0	...	Boiled

GLOSSARY OF VITAMIN TERMS.

Achromotrichia. Depigmentation of fur in rats, apparently due to lack of some member of the B-complex.

Adaptometer. An instrument for detecting early evidence of night-blindness.

Adenylic Acid. Adenine ribose phosphate, $C_{10}H_{12}N_5O_4.HPO_3$, enters into composition of co-dehydrogenase I and II. Also called adenosine monophosphate.



Adermin. Early name for vitamin B_6; unsuitable since dermatologic lesions are still seen in the presence of this vitamin; György suggests (1940) that B_6 be called *pyridoxine*.

Almquist-Stokstad Unit. One of many units for vitamin K, approximately equal to one-half an Ansbacher unit.

Alpha. Terms with this prefix will be found under the name of the substance, as alpha-tocopherol under Tocopherol.

A. D. M. A. units. See following items.

American Drug Manufacturers' Association unit for vitamin A. Equivalent to Sherman-Munsell unit.

American Drug Manufacturers' Association unit for vitamin D. Equivalent to about one-third of the I.U. or U.S.P. unit.

Aneurin. European term for vitamin B_1; thiamine.

"Animal Protein Factor". Substance produced by bacterial fermentation in henhouse litter which, when consumed by hens on vegetarian fare, aids in hatching eggs.

Ansbacher Unit. One of the many units employed for vitamin K and roughly equal to 20 Dam units.

Antagonist. A substance chemically related to a vitamin which is capable of counteracting the biological activity of the vitamin in question.

Anti-acrodynia factor. Vitamin B_6, essential for growth and prevention of rat pellagra and dermatitis (György).

Anti-beri-beri vitamin. Vitamin B_1; thiamine.

Anti-hemorrhagic factor. Vitamin K.

Anti-hemorrhagic flavone glucosides. "Vitamin P".

Anti-infective Principle. Used without justification for vitamin A.

Anti-keratinizing vitamin. Vitamin A.

Anti-metabolite. A substance chemically related to naturally-occurring agents within the body and capable of interfering with their normal action.

Anti-neuritic vitamin. Vitamin B_1; thiamine.

Anti-oxidant. A substance capable of retarding chemical deterioration, as rancidity in fats. Examples include (1) a lecithin-tocopherol combination which protects vitamin A from oxidation in air (Kern, 1948); and (2) vitamin C when used to prevent darkening of commercial packs of frozen peaches and apricots.

"Anti-pernicious anemia principle". See LLD factor (Shorb, 1948).

Anti-rachitic factor. Vitamin D.

Anti-scorbutic factor. Vitamin C.

Anti-sterility vitamin. Vitamin E, although reproductive potency is only a part of E function.

ness Factor. Agent first found in fresh kale and fresh raw cream prevents muscle and wrist changes in guinea pigs, not the grass actor nor vitamin E. The stiffness syndrome probably not the y effect of deficiency of this factor so much as a result of the panying deranged phosphorus metabolism. Search is being made rrective factors among sterol derivatives (Oleson, 1947). A lline factor has been isolated from cane sugar juice (van Wagten- 1947).

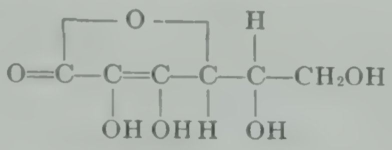
ophthalmic vitamin. Vitamin A.

vin. Antagonist to riboflavin (Euler and Karrer, 1946).

onic Acid. One of the three recognized essential fatty acids: COOH possessing 4 unsaturated bonds which on full hydrogenation arachidic acid, $C_{19}H_{39}COOH$.

$H_{11})_4CH=CHCH_2CH=CHCH_2CH=CHCH_2CH=CH(CH_2)_3COOH$

Acid. White crystalline substance soluble in water and alcohol, O_6, of the seven structural variants of this acid already synthesized, rbic acid is the most potent and is the compound indicated when in C or simply ascorbic acid is mentioned:



orbyl palmitate. Agent used as lard preservative; possesses anti- putic activity (equivalent on molar basis).

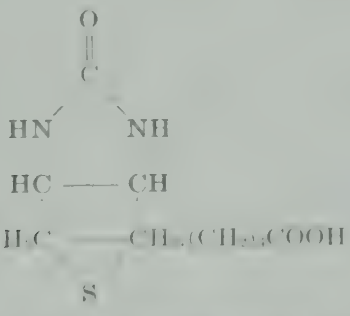
.0. Trade name for dihydrotachysterol emphasizing its anti-tetany t.

. Also known as avidalbumin, the agent in raw egg-white which bines with biotin and renders it useless to the body.

Terms with this prefix will be found under the name of the substance, eta-carotene under Carotene.

otometer. An American instrument (Frober-Faybor Company, veland, Ohio, 1937) which is more sensitive than the Birch-Hirschfeld tometer in detecting border-line cases of vitamin A deficiency.

. Previously known as Vitamin H and Coenzyme R. Crystalline in obtained in 1941 by DuVigneaud, $C_{10}H_{16}O_3N_2S$. Commercially ilable as the crystalline monomethyl ester. Biotin is hexahydro- xo-1-thieno-(3,4) imidazole-4-valeric acid:



forms postulated, alpha isolated from egg-yolk and beta from r and milk; probably identical. Biotin functions as a catalyst ch joins with manganese in regulating CO_2 utilization in plant animal cells. Biotin, also adenylic acid, activates deamination spartic acid, serine, and threonine (Lichstein and Christman, 1948).

-Hirschfeld photometer. An instrument devised in 1916 for the surement of dark adaptation; manufactured by Carl Zeiss, Inc.

ite-binding substances (B.B.S.). Chiefly pyruvic acid in biologic ds; increased in thiamine deficiency.

Blue units. Means of measuring the blue color obtained with $SbCl_3$ and vitamin A or carotene.

Butter Growth Factor. Appetite-stimulating factor in butter as compared with vegetable fats in the diet of rats when lactose is the sole carbohydrate; advantage disappears when other carbohydrates are present.

Calciferol. Crystalline vitamin D_2, pure activated ergosterol.

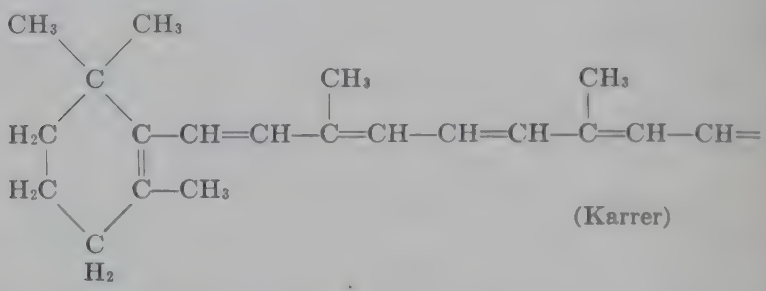
Calcifying vitamin. Vitamin D.

Capillary resistance. Resistance of capillary wall to rupture under pressure.

Carboxylase. An enzyme which converts the carboxyl group (—COOH) into CO_2.

Carotenase. An enzyme occurring in the liver which transforms carotene into active vitamin A.

Carotene. An intensely yellow hydrocarbon pigment, $C_{40}H_{56}$, three forms exist: alpha, beta, and gamma, beta being the most active precursor of vitamin A; its half-formula is:



(Karrer)

Crystalline carotene is available in separate alpha and beta forms or as a mixture consisting of 90% of the latter and 10% alpha.

Carotin. Identical with carotene.

Carotinoid pigments. A group of lipochromes which may be hydrocarbons (as carotene), alcohols (as kryptoxanthin), ketones or acids; characterized by many double bonds.

Cereal germ. Embryo of wheat removed in milling of flour; highly concentrated source of vitamin B_1 and E; also contains large amount of G and an appreciable amount of A; it is a good source of nicotinic acid and pyridoxin.

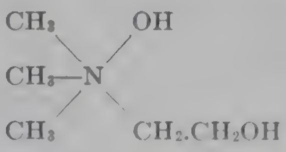
Cevitamic acid. The term for vitamin C favored by the Council of Pharmacy of the American Medical Association, whereas chemical opinion inclines toward ascorbic acid, which see.

Chick antidermatitis factor. Pantothenic acid.

Cholane nucleus. See under ergosterol.

Cholesterilene sulfonic acid. One of the vitamin D group (Yoder, 1936–37).

Choline. Hydroxyethyl trimethyl ammonium hydroxide:

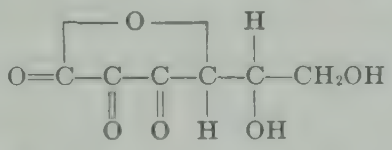


Citrin. Original term used by investigators for vitamin P isolated from lemons. It is a mixture of eriodictin, eriodictyol glucoside, hesperidin and quercitrin-like flavone pigments. Related agents are hesperidin, chalcone and rutin. These manifest anti-oxidant activity toward epinephrine, also toward milk fat and lard.

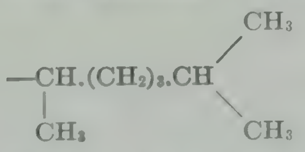
Member of the vitamin B complex, particularly concerned with metabolism of fats and the sulfur-containing amino acids. Commercially available as choline chloride.

Coacetylase. Possibly pantothenic acid functions in a coenzyme for acetylation processes, such as occur naturally as with choline or when drugs, like sulfonamides, are employed. Lipmann's enzyme (1947)

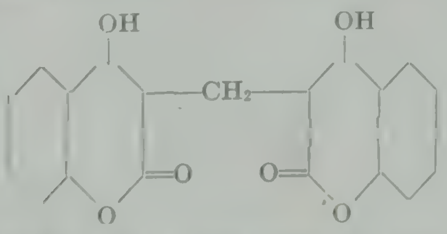
ylase. Thiamine pyrophosphate, diphosphothiamine or phos-
ated vitamin B_1; functions as a catalyst for the oxidation and
oxylation of pyruvic acid which is an intermediary product in
ydrate metabolism.
boxylase. Pyridoxal phosphate.
drogenase I. Cozymase; consists of nicotinamide, adenylic acid,
and phosphoric acid.
ne A. Coacetylase (Kaplan and Lipmann, 1947).
ne I. Cozymase; diphosphopyridine-nucleotide; functions as a
gen transporter in biologic oxidations; in red blood cells rapidly
vated by hemolysis; 20–35γ per gram of whole human blood
rod and Elvehjem, 1939).
ne II. Triphosphopyridinenucleotide; Warburg's coenzyme.
ne R. A growth and respiratory factor for many strains of the
e nodule organism Rhizobium; Biotin.
ent. Warburg's term for the cozymase of von Euler.
nins. Substances present in foods which stabilize the vitamins
st inactivation.
se. Co-dehydrogenase, diphosphopyridine nucleotide (nicotin-
e, adenylic acid, ribose and phosphoric acid).
xanthin. A yellow pigment capable of conversion into active
nin A.
nit. This unit for vitamin K is based on a specially prepared
spinach arbitrarily assigned 500 units per gram. 1 gram pure
min K_1 = 12,000,000 Dam units.
Unit. One of several employed for vitamin K and very roughly
valent to 25 Dam units.
daptation. The increasing sensitivity of the eye to light in a "totally"
kened room.
adaptation test. A light sensitivity test for determining vitamin A
ciency.
ro-ascorbic acid. A reversibly oxidized form of ascorbic acid,



ydrocholesterol. When activated becomes vitamin D_3. The formula
imilar to that shown for ergosterol except that the side chain is:



lrogenase. An enzyme which catalyzes a reaction resulting in oxi-
on of metabolites by removal of hydrogen (Best and Taylor, 1937).
ydrositosterol. One of the provitamin D group (Wunderlich, 1936).
xypyridine. Antagonist to pyridoxine (Ott, 1946).
marol. 3,3′-methylene-bis-(4-hydroxycoumarin):

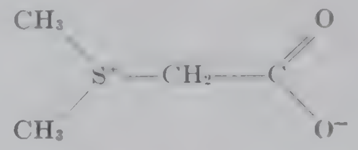


thesized by Link et al (1941); prolongs prothrombin and coagulation
es; action inhibited by large doses of vitamin K; sometimes classed
the vitamins.

22-Dihydroergosterol. When activated becomes 22-dihydroca... vitamin D_4.

Dihydrotachysterol. An irradiation product of ergosterol with... rachitic effect; it combats tetany by raising the serum calcium...

Dimethylthetin. Also called sulfobetaine, a biological source of... methyl groups (duVigneaud, 1948):



Diopterin. Trade name for modified form of folic acid: alpha form... pteroyldiglutamic acid.

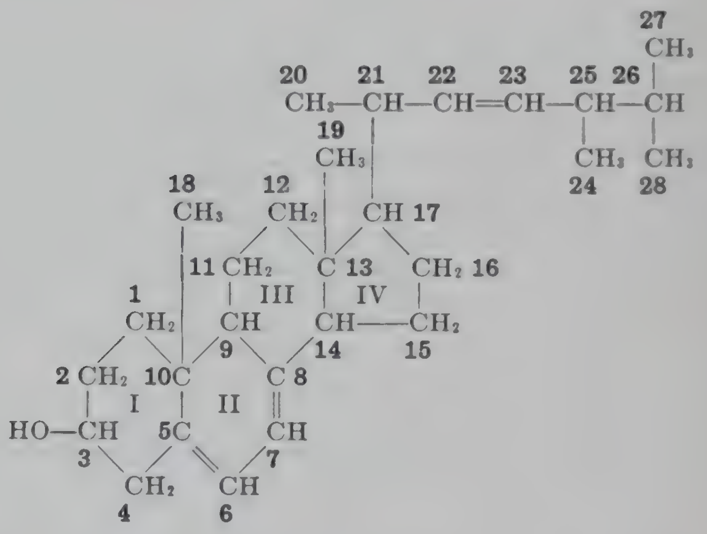
Diphosphopyridine nucleotide. Coenzyme I, consists of one nicotinamide group, one adenine, two pentose, and two phosphoric acid groups.

Durohydroquinone. A substance chemically related to vitamin E.

Dysaptation. Pathologic dark adaptation in which the time required for reaching the light threshold is prolonged beyond the normal period (Feldman).

Egg-white injury. Toxic effect of avidin in raw egg-white.

Ergosterol. Provitamin D_2; structural formula demonstrates numbering of positions in cholane nucleus and side chain:



Activation is thought to result in opening ring II between ninth and tenth carbon atoms, with the result that the eighteenth carbon atom drops a hydrogen and receives a double bond.

Eriodictin. See citrin.

Evans unit. This unit for vitamin E is based on the minimum requirement whereby normal rat litters are obtained under fixed conditions.

Factor I. Antidermatitis factor of Lepkovsky, Jukes, and Krause (1936): vitamin B_6.

Factor S. Essential for chicks, apparently correlated with or identical to strepogenin (Scott, 1947).

Factor U. A water-soluble growth factor required by chicks in addition to polished rice, washed fish meal, riboflavin and vitamin B_6 (Stokstad *et al.*, 1940).

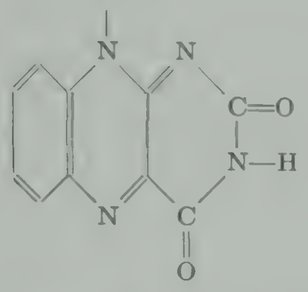
Factor W. Frost and Elvehjem's (1937) rat growth factor apparently required if riboflavin is to be fully effective; is multiple in nature, containing in concentrates appreciable amounts of pantothenic acid.

Factor Y. Antidermatitis factor of Chick and Copping (1930), possibly vitamin B_6.

ds, essential. The three acids in this classification can replace ther dietetically. For structure, refer to linoleic, linolenic and donic acids. While these acids are needed in the diet, other must be made available to the body for controlling peroxide ion at the double bonds, else toxic effects (as anemia) or destruction results. The latter is known to affect carotene, vitamins E, and certain members of the B complex with the consequence leficiency symptoms may arise.

Factor. Lepkovsky and Jukes' (1936) water-soluble, chick antiatitis factor obtained from liver extract; identified as pantothenic but undoubtedly multiple in nature; also used for rat growth factor.

Water-soluble, yellow-green fluorescent pigments which occur in tuffs, either free or bound to protein, chemically they are characd by the iso-alloxazin nucleus:

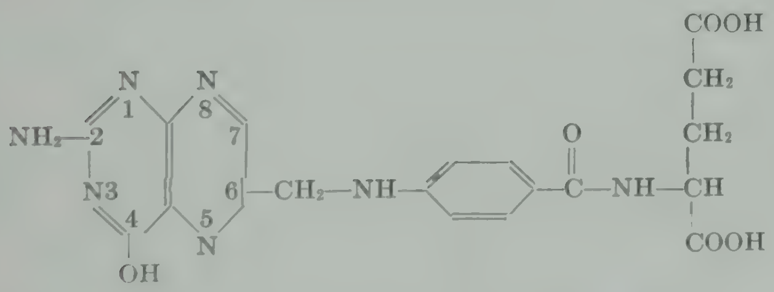


ough often designated as to source as hepatoflavin, ovoflavin, lactoavin, etc., the common name for all is riboflavin because of the resence of the sugar ribose as a side chain on the tricyclic chromophore ucleus. Addition of this sugar to the chloroform-soluble nucleus renders ne compound water-soluble. The only side chains compatible with itamin potency are d-ribose and l-arabinose (Booher, 1938).

nes. A group of pigments including vitamin P.

protein. Protein combination with riboflavin (vitamin B_2) which ctions as an oxidation catalyst; the yellow enzyme.

Acid. This term has been used to cover a group of related substances nd in green leaves. The synthetic product obtained in 1946 is own as pteroylglutamic acid. Other active agents include pteroic d, pteroyl triglutamic and heptaglutamic derivatives. The suggested mical structure involves a pyrimido-(4,5)-pyrazine (or pterin) leus linked to para-aminobenzoic acid and this in turn to glutamic d:



mes describing folic acid activity: Vitamin B_c, L. casei factor, amin M, PGA, pteroylglutamic acid (synthetic).

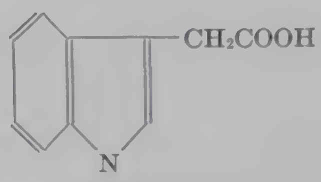
acid conjugate. Pteroyl-hexa-glutamyl-glutamic acid.

s vitamine. Vitamin B_1; thiamin.

na. Terms with this prefix will be found under the name of the subnce, as gamma-carotene under Carotene.

na. 0.001 mg. = 1γ, used for convenience in designating concentrans of very low value; same as microgram, μg.

Glare blindness. An abnormal sensitiveness to brilliant illumination which may be due to vitamin A deficiency; the term, nyctalopia, is sometimes applied to this condition.
Goldberger's vitamin. Vitamin G, vitamin P-P, pellagra-preventive vitamin.
Grass Juice Factor. A growth-promoting, water-soluble factor found in summer milk, green grass and some vegetables apparently needed by guinea pigs, rabbits and rats.
György. This Hungarian name is borne by two noted investigators in the realm of water-soluble vitamins and respiratory enzymes: Albert Szent-Györgyi and Paul György.
Hemeralopia. Literally, day sight, but by convention used for night blindness.
Hepatoflavin. Flavin isolated from liver; riboflavin, vitamin B_2.
Hesperidin. A flavanone glucoside found in lemons and oranges which when acted upon by a mild alkali gives the acid-unstable hesperidin chalcone.
Hexachlorocyclohexane. An insectide analogue of inositol inhibiting its action in yeast.
Hexahydroxycyclohexane. Inositol.
Hexuronic acid. Early and erroneous chemical name for vitamin C.
7-Hydroxycholesterol. One of the provitamin D group (Bills, 1938).
Indole acetic acid. Agent found in corn which has a pellagragenic effect:



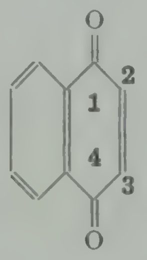
Inhibitors. Substances chemical related to vitamins which are capable of antagonizing biological activity of their analogues.
Inositol. Inosite. Cyclic hexahydric alcohol, $C_6H_6(OH)_6$: member of vitamin B complex; mouse alopecia factor (Wooley, 1940); growth factor for rats and curative of spectacled eye (Pavcek and Baum, 1941). May be essential part of enzyme α-amylase (R. J. Williams, 1948).
International Unit of Vitamin A. 0.0006 mg. beta-carotene.
International Unit of Vitamin B_1. 0.003 mg. thiamin hydrochloride (adopted by international committee on vitamin standardization, 1938; accepted by Council on Foods, A. M. A., 1939).
International Unit of Vitamin C. 0.05 mg. ascorbic acid.
International Unit of Vitamin D. 0.025γ calciferol.
Keratitis. A sometimes blinding eye disease caused by riboflavin deficiency.
Keratomaliacia. Softening of the cornea; last stage of eye manifestations of vitamn A deficiency.
Kit ol. Substance found in whale liver oil which decomposes on heating to vitamin A; occurs in other fish liver oils also, except in some fresh water species; is chemically but not biologically provitamin A.
"Koagulations-vitamin." Vitamin K.
Kryptoxanthin. A yellow pigment, $C_{40}H_{55}OH$, capable of conversion into active vitamin A; found in egg-yolk and yellow corn.
Lactoflavin. Flavin isolated from milk; riboflavin,.vitamin B_2.
L. C. F. L. casei factor; folic acid.
Light threshold. Smallest amount of light visible to the dark-adapted eye.
Linoleic acid. One of the three recognized essential fatty acids, $C_{17}H_{31}COOH$, possessing two unsaturated bonds. On complete hydrogenation stearic acid, $C_{17}H_{35}COOH$, is formed.

$$CH_3(CH_2)_4CH=CHCH_2CH=CH(CH_2)_7COOH$$

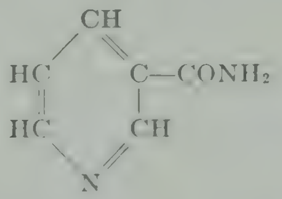
Linolenic acid. Another of the essential fatty acids, $C_{17}H_{29}COOH$ possessing three unsaturated bonds:

$$CH_3CH_2CH=CHCH_2CH=CHCH_2CH=CH(CH_2)_7COOH$$

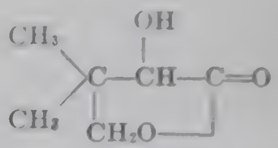
Coacetylase. An enzyme containing pantothenic acid involved
ylation of aromatic amines and in choline metabolism.
Name applied to fraction from pancreas which prevents or
s fatty livers in depancreatized dogs.
or. Lactobacillus lactis Dorner requires two agents which have
etected and named LLD and TJ factors. LLD factor apparently
ed to activity of commercial liver preparations used in treating
ous anemia, and has been labelled vitamin B_{12} (Rickes, 1948).
i blue units. Means of measuring the blue color obtained with
and vitamin A or carotene in which the Lovibond glasses serve as
rds.
rol. Isomer of ergosterol obtained during activation, non-anti-
ic.
e. A red carotenoid pigment found in tomato and watermelon.
one. Trade name for synthetic vitamin K, 2-methyl-1:4-naph-
inone.
thone. British trade name comparable to the American mena-
.
Multi-Purpose Food, an all-vegetable, low-cost protein food
ntly sent from the U. S. A. to famine areas; a source of protein,
m, iron, vitamin A, thiamine, riboflavin, niacin and vitamin D.
phthoquinones. The nucleus in vitamin K:

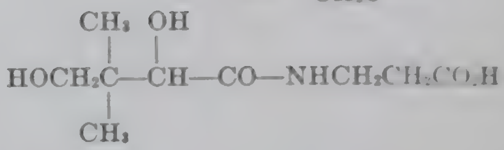


tamin A. Geometrical isomer of vitamin A isolated from fish-liver
(Robeson and Baxter, 1947). Present in synthetic vitamin A.
ve" vitamin. Vitamin B_1; thiamine
n. Term recommended for nicotinic acid when addressed to the
eral public to avoid the connotation of poisoning popularly associated
h nicotine. Scientific literature should continue to use the term
otinic acid.
inamide and nicotinic acid. The pellagra-preventive vitamin; Gold-
ger's vitamin; pyridine-β-carboxylic acid, $C_5H_4N.COOH$, or the amide:



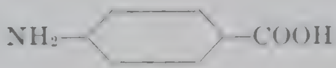
-blindness. Subnormal acuity of vision in dim light or slowness of
overy of vision after exposure to a dazzling light.
lopia. Used by some to designate night-blindness or glare blindness.
nopia. Literally, night sight, used by some for night-blindness.
unit. 1 I.U. or U.S.P. unit of vitamin D = 1.6 Oslo units.
avin. Flavin isolated from eggs, riboflavin, vitamin B_2.
. Para-aminobenzoic acid.
othenate Inhibitor. Several are known, such as phenylpanthenone,
acteriostatic agent inhibited also by glutamic acid, proline or histidine.
thenic acid. The 8th vitamin to be synthesized (Williams, Major,
ler, Kereztesy and Finkelstein, 1940); the physiologically active
tothenic acid (II) is α-hydroxy-β,β-dimethyl-γ-butyrolactone (I) con-
sed with β-alanine:

(I) 

(II) 

Pantothenic acid functions as a coenzyme regulating acetylation reactions.

Para-aminobenzoic Acid. A member of the Vitamin B Complex.



It antagonizes the action of the sulfonamide drugs (Woods, 194

Pellagra-preventive vitamin. Nicotinic acid or its amide.

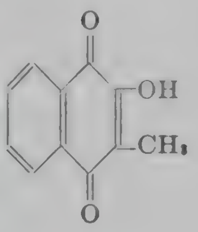
Permeability vitamin. Vitamin P, the existence of which is disputed

Petechiæ. Small, subcutaneous clots caused by rupture of the capillary walls.

PGA. Pteroylglutamic acid, synthetic folic acid.

Phosphatase. An enzyme which releases inorganic P from organic combination.

Phthiacol. A yellow pigment isolated from human tubercular bacilli known to possess vitamin K activity; somewhat toxic; vitamin K can be converted into phthiacol (Fieser, 1940).



Porphyrins. Certain pigments which result from abnormal degradation of hemoglobin or from precursors of hemoglobin; associated with nicotinic acid deficiency.

Poulsson unit. Same as Oslo unit of vitamin D.

P-P body. Term used by Goldberger for factor preventive of human pellagra; formerly believed identical with vitamin B_2 or G, now thought to be nicotinic acid or its amide.

Protective factor X. Vitamin-like substance which protects against egg-white injury (Boas, 1927).

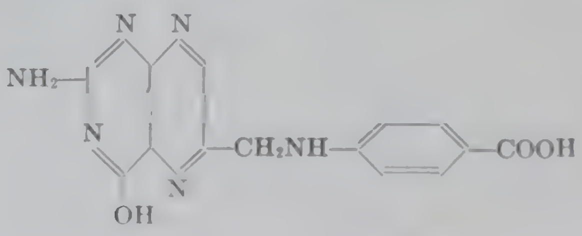
Prothrombin factor. Vitamin K.

Provitamin A. Carotene.

Provitamin D. Ergosterol and related sterols.

Pterins. See Pteroic acid.

Pteroic acid. Precursor of folic acid. Its formula shows the pterin nucleus combined with para-aminobenzoic acid.



hosphate. A coenzyme unit in transaminase systems involving and aspartic acids. Also, a coenzyme in decarboxylation ne, glutamic acid and tyrosine. Also, may aid in converting , ammonia and indole into tryptophane.

ine. Irradiated pyridoxamine is under investigation as a gent for gram-negative micro-organisms not affected by peni- in typhoid and dysentery (Shwartzman, 1948). See also B_6.

e. See vitamin B_6.

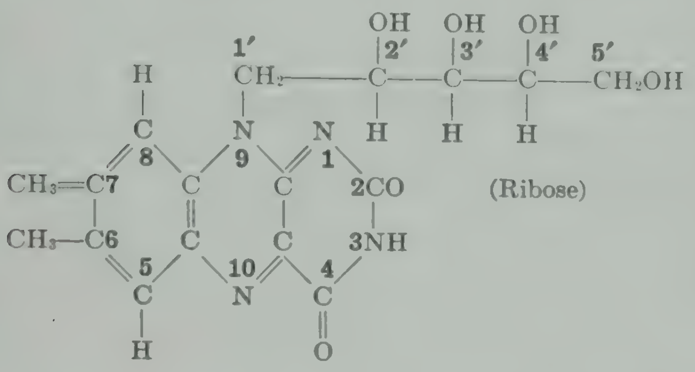
cid. $CH_3.CO.COOH$,

Visual yellow, the pigment which results when rhodopsin is d by light.

in. On hydrolysis yields formic acid and pteroic acid, a pre- of folic acid.

n. Visual purple, the photosensitive pigment of the rods of the

n. Lacto-, ovo-, or hepatoflavin, vitamin B_2 or G, an orange- crystalline pigment (12 mg. dissolves in 100 cc. of water at 27.5° C. a yellow-green fluorescent solution); 6,7-dimethyl-9-(1′-*d*-ribityl)- azin, $C_{17}H_{20}N_4O_6$.



A glucoside of quercitrin obtained from many sources but commonly iated with buckwheat. It decreases capillary fragility in man r conditions where the fragility has first been increased (Griffith, .

n-Bourquin (1931) Unit of Vitamin B2. Earlier taken as 0.0025 mg. avin; accepted by Council on Foods, A. M. A., 1939, as about mg. riboflavin; stated by Munsell (1940) to be equivalent to 3.0– icrograms.

n-Chase unit. A unit for vitamin B_1 variously regarded as equiva- o one-half or one-fourth of the International Unit; although varying 0.7 to 4 or 6 Sherman units, Munsell (1940) suggests that 1 Inter- nal Unit generally is equivalent to 1 Sherman unit.

n unit for vitamin C. Equivalent to 10–15 I.U., lower value ted by Munsell (1940).

n-Munsell unit. Equivalent to about 1.4 I.U. of vitamin A (1933); cil on Foods of A. M. A. (1939) insists upon use of factor 0.75 for rsion of Sherman units into International Units; Munsell (1940) sts that 1 Sherman unit be taken as 0.7 I.U.

ctor. Streptococcus lactis R factor, possibly pteroic acid. See acid.

ck unit. Equivalent to 3.3 I.U. of vitamin D.

enin. Growth factor and nutritive essential for certain hemolytic ococci (Woolley, 1941); probably a peptide.

taine. See dimethylthetin.

erol. Isomer of ergosterol obtained during activation, slightly toxic

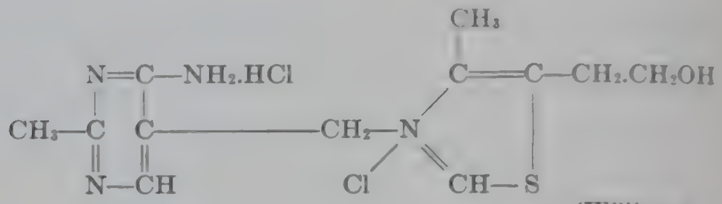
erol. Isomer of ergosterol obtained during activation, not anti- ic.

Teropterin. Trade name for pteroyltriglutamic acid (the [illegible] 5 isomers are recognized by suitable linkages of alpha [illegible] forms.

Thayer-Doisy Unit. One of the many units employed for [illegible] roughly equivalent to 30 Dam units.

Thiamine. Vitamin B_1, aneurin, torulin.

Thiamine hydrochloride. U.S.P. term for thiamine chloride, the [illegible] chloride of vitamin B_1, $C_{12}H_{17}N_4SO.Cl.HCl$:



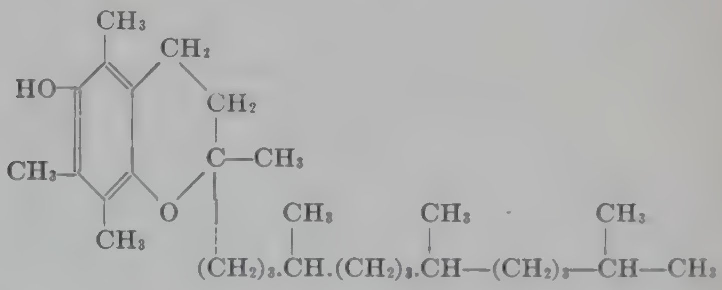
(Williams)

Thiochrome. A blue fluorescent compound derived from thiamine by [illegible] dation, possessing no vitamin activity.

Tillmans' indicator. 2,6-dichlor-phenol-indophenol, used for determining ascorbic acid.

TJ factor. See LLD factor.

α-tocopherol. One of the forms of vitamin E, deriving its name from the Greek, to bear child; reddish-yellow, highly viscous oil soluble in most fat solvents and the majority of vegetable oils; 2-methyl-2-hexadecyl-6-hydroxy-5,7,8-trimethylchromane, $C_{29}H_{50}O_2$:



β-Tocopherol. Xylotocopherol, $C_{28}H_{48}O_2$, one of the E group; ortho, meta, and para forms are all active; the para position of hydroxyl group and oxygen bridge is vital to E activity.

α-Tocopherol. An isomer of β-tocopherol, found particularly in cottonseed and corn embryo oils.

α-Tocoquinone. Oxidation product of α-tocopherol, first thought to have E activity.

Torulin. Vitamin B_1; thiamine.

Toxisterol. Isomer of ergosterol obtained during activation, not anti-rachitic, toxic.

Transaminase. Also called co-aminopherase. This enzyme reaction involves mutual exchange of amino and keto groups, possibly acting through pyridoxal⇄pyridoxamine.

Tri-ethylcholine. Antagonist of choline by competing with it.

Triphosphopyridine nucleotide. Coenzyme II, contains one nicotinamide group, one adenine, two pentose, and three phosphoric acid groups.

United States Pharmacopeia units for vitamins A and D. U.S.P. XIII (1947) unit is the same as International Unit.

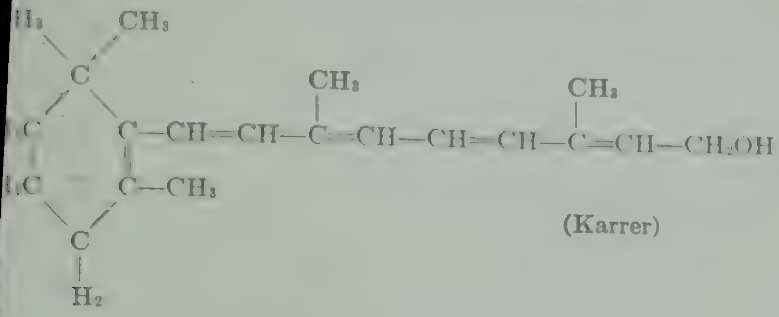
"Universal" vitamin. Pantothenic acid.

Vaccenic Acid. Isomer of oleic acid, $C_{17}H_{33}COOH$, with double bond between C_{11} and C_{12} carbons; good growth factor for rats found in summer butter.

ple. Rhodopsin, the pigment found in the retinal rods which **vitamin A for its production.**

ow. Retinene, the pigment which results when rhodopsin is **by light.**

. Fat-soluble, anti-xerophthalmic vitamin, $C_{20}H_{29}OH$:



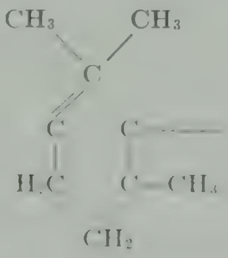
(Karrer)

A Standard. Vitamin A acetate in corn oil (new as of July 1947).

A synthetic. Synthesized by Arens and van Dorp (1947) and rcial production begun in September 1947. Identical with l vitamin A of marine origin, a mixture of vitamin A and neon A.

A₂. Examination of tissues of salt water fish and their liver oils he fluorescent microscope reveals a brilliant yellow fluorescence is ascribed to vitamin A. Fresh water fish show a brownish- fluorescence The latter has been designated vitamin A_2. Both are destroyed bythe irradiation.

in A_2 has been obtained in pure form by Shantz (1948). Its ila is unsettled although some believe it is related to vitamin A opene is to beta-carotene. The Karrer formula (1941) suggests ing as opening thus:



B. This term should not be used; for clarity "Vitamin B Complex' eferred.

B₁. Thiamine, a pyrimidine-thiazole compound of which the ide is $C_{12}H_{18}N_4SOCl_2$, anti-neuritic vitamin, antiberi-beri vitamin, rin; for chemical formula, see thiamine hydrochloride.

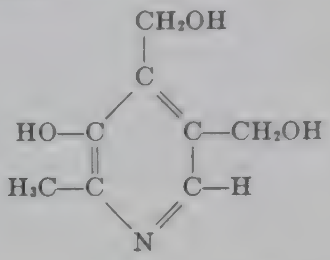
B₂. Vitamin G, as ordinarily used is a complex consisting of al factors chief of which are riboflavin and nicotinic acid, present ncy (1940) to employ B_2 as designation for riboflavin; sometimes for that part of the B complex containing riboflavin and B_6; for ical formula, see Riboflavin.

B₃. Williams and Waterman's (1927) highly thermolabile factor yeast, necessary for weight maintenance in birds. Dam and Alm-'s gizzard erosion factor may be identical with B_3.

B₄. Formerly called B_3; Reader's (1929) antiparalysis factor in may involve a condition due to chronic B_1 deficiency; found in yeast.

Vitamin B₅. Peters' (1930) thermolabile factor, found in whole wheat or yeast, which maintains pigeon weight on a polished rice diet.

Vitamin B₆. György's anti-acrodynia factor; also called vitamin H, also called Factor I; isolated (1938) by Keresztesy and Stevens as the hydrochloride, $C_8H_{12}O_3.HCl$, synthesized (1939) as 2-methyl-3-hydroxy-4,5-(hydroxymethyl)-pyridine:



called *pyridoxine* (György, 1940).

It is thought that this vitamin is as important to protein metabolism as is thiamine to the carbohydrates. Various organisms respond to one or the other forms, but not necessarily to all: pyridoxine, pyridoxal, pyridoxamine, functioning alone or in combination with phosphate.

Vitamin B₇. See vitamin I.

Vitamin B₁₂. A red crystalline compound obtained from liver and active against pernicious and other anemias; a cobalt complex (Rickes, 1948). Isolated in crystalline form from the mold streptomyces griseus (Merck & Co., 1948).

Vitamin B₁₄. Isolated as small brown crystalline balls from human kidney excretions (Norris and Majnarich, 1949); increases production of red blood cells in bone marrow; checks reproduction of cancer cells (rabbit). May be a hormone rather than a vitamin.

Vitamin Bc. The Hogan-Parrott factor (1940) which occurs in the B complex, lack of which is responsible for a typical anemia in chicks. Now known to be folicacid.

Vitamin Bp. Member of the B complex concerned with the development and shape of bones of chicks (Hogan *et al.*, 1940).

Vitamin Bₜ. Unknown factor required by Tenebrio, the common mealworm.

Vitamin C. Water-soluble *l*-ascorbic acid, which see.

Vitamin D. A group of activated sterols possessing anti-rachitic potency.

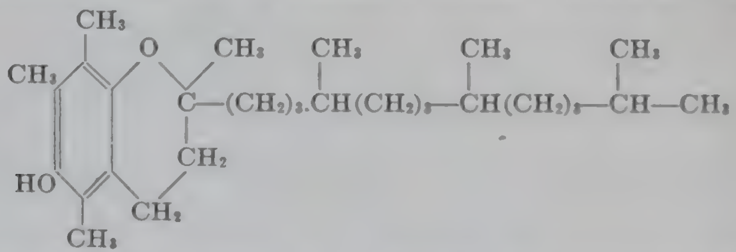
Vitamin D₁. Thought to be a pure vitamin but later found to be a mixture of calciferol and lumisterol.

Vitamin D₂. Calciferol, the result of irradiating ergosterol which see.

Vitamin D₃. The result of irradiating cholesterol or 7-dehydrocholesterol. Crystalline form now available; probably a new standard will be set on this basis.

Vitamin D₄. The result of irradiating 22-dihydroergosterol.

Vitamin E. Like vitamin D may contain a number of different forms of a parent substance or several separate factors; α-tocopherol, $C_{29}H_{50}O_2$,



Preferably the term Vitamin E is applied to mixtures of analogues, not to alpha or any of the three other tocopherols known to occur naturally: α, β, γ, δ. The first named is the most potent and is used as the standard of reference. δ-tocopherol is the least active biologically but the best as an antioxidant with decreasing order: δ, γ, β, α (Stern, 1947).

. Used by some to designate certain fatty acids, as linoleic, to nutrition; not endorsed by American Biochemical Associa- omenclature Committee; no vitamin by this name exists at (1949)

. Term adopted by the American Society of Biological Chemists to describe the antidermatitis or antipellagra component of the B complex. The corresponding British term is B_2. Present y (1940) to consider vitamin G a complex with riboflavin known

H. Water-soluble vitamin which occurs in a complex insoluble fat and water; prevents egg-white injury; biotin, coenzyme R amin H are the same.

H. This letter assigned by Booher (1937) to a rat growth factor; 'ay, Bing and Dilley (1928) to a factor needed by trout; used by yörgy for a factor found in liver, kidney and yeast whose absence a typical dermatitis in rats, now known as B_6, the anti-acrodynia applied by György (1939) to agent which counteracts toxicity of ite.

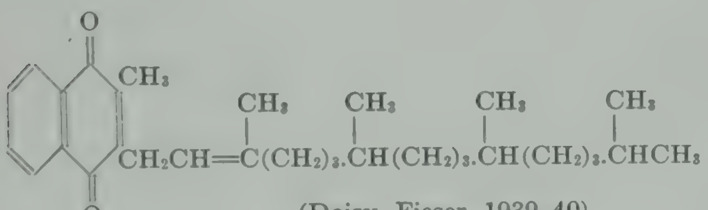
H_2. György's factor which offsets egg-white injury.

I. Centanni's alcohol extractable factor preventive of digestive ances in pigeons; not antineuritic; sometimes called B_7.

J. Von Euler and Malmberg's fruit factor said to be corrective of ionia in guinea pigs.

K. Fat-soluble, antihemorrhagic factor; several derivatives of phthoquinone have been shown to have vitamin potency; the -soluble 1,4-dihydroxy-2-methylnaphthalene and 4-amino-2-methyl- hthol are also active (Doisy).

K_1. The alfalfa principle which is a yellow oil, 2-methyl-3-phytyl- phthoquinone,

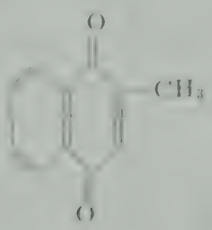


(Doisy, Fieser, 1939–40)

n K_1 oxide. The introduction of oxygen occurs by opening the le bond in the ring at positions 2 and 3 where the methyl and yl side chains occur. This oxide is unlike its parent in that it t acted upon by light.

n K_2. A 2,3 substituted 1,4 naphthoquinone; both positions may be pied by the same unsaturated hydrocarbon chain or there may be ble length chain on 3 and a methyl group on 2. Fieser, Doisy, 1940.

n K Synthetic. This is more powerful than the natural form. 2-methyl-1:4-naphthoquinone. In Vitamin K_1 which is found



reen leaves the side chain is the phytyl radical. In Vitamin K_2, product obtained with putrefaction processes, the side chain is difarnesyl radical, notably unsaturated. The potency of 2-methyl- arnesyl-1:4-naphthoquinone is about two-thirds that of Vitamin K_1.

Vitamin K Standard: 1 microgram of 2-methyl-1,4-naphthoquinone = 1 unit.

Vitamin L_1. Extracted from cow's liver in concentrated form.

Vitamin L_2. Extracted from dried yeast. The L vitamins prevent lactation failure in rats from hypophyseal dysfunction.

Vitamin M. Member of the B complex needed by monkeys for building blood; folic acid subsequently shown to possess vitamin M potency (Day, 1948).

Vitamin P. Rusznyák and Szent-Györgyi's flavone compound originally designated as citrin, which see. Several natural compounds are known to supplement the effect of vitamin C in maintaining normal capillary resistance.

Vitamin P-P. Pellagra-preventive, Goldberger's vitamin; nicotinic acid or its amide.

Vitamin U. Unidentified anti-ulcer factor (chicks and guinea pigs); fat-soluble and heat labile; found in alfalfa, kale, fresh milk and green, raw egg-yolk, wheat bran, liver fat, soybean and olive oils, and gastric mucosa (Cheney, 1948).

Vitamin X. Former designation of vitamin E.

Warburg's coenzyme. Triphosphopyridine nucleotide.

Warburg's enzyme. The yellow respiratory enzyme, a flavo-protein, combined form of vitamin B_2.

Wheat-germ. Embryo of wheat removed in milling of flour; highly concentrated source of vitamin B_1 and E; also contains large amount of C and an appreciable amount of A.

Xanthophyll. Used as synonymous with lutein, $C_{40}H_{56}O_2$, a pigment in green leaves; or as the group name for certain carotenoids of alcohol or ketone structure; not a precursor of vitamin A.

Xanthosis cutis. Pigmentation of the skin attributable to yellow dietary pigments.

Xerophthalmia. A dry and thickened condition of the conjunctiva; occurs in marked vitamin A deficiency.

Xerosis conjunctivæ. Dryness of the conjunctiva, second stage in vitamin A deficiency.

Yellow enzyme. Warburg's enzyme, a flavo-protein which functions as a hydrogen acceptor in biologic oxidations; a combined form of vitamin B_2.

Zeaxanthin. A xanthophyll which is found in yellow corn and egg-yolk.

CHAPTER XVIII.

ALCOHOLIC BEVERAGES.*

ction.—Alcoholic beverages of various kinds may become
caloric articles of diet and will tend to play an important
he lives of a great proportion of the population, particu-
e the elimination of prohibition in America. For reasons
uel value, their appetizing and stomachic reactions, and as
enchers, alcoholic beverages may find permanent places in
of many people. A comprehensive list of their compo-
d fuel values is found elsewhere.

Types of Alcoholic Beverages.

Liquors.—As the name implies, the chief raw material used
preparation of malt liquors is malt—usually barley malt.
ter extraction of the ground malt is boiled with hops, then
and, after adding yeast, is fermented; subsequent storage of
mented fluid for three months or more produces maturity
rewith a characteristic taste and aroma.

various types of malt liquors, such as **lager beer, ale, porter,**
tc., are the result of variations in the process of manufacture,
s the use of different species of yeast, different amounts and
of malt and hops. Various methods of processing, such as the
on of specific temperature ranges during the period of mixing
ing) the ground malt with water or during the main fermenta-
nd storage, again alter the end-product.

t liquors have a low alcohol content compared with wines and
ed liquors, but usually have a considerably higher amount of
ydrate and protein. In countries in which the per capita
nption of beer is high, beer furnishes a considerable part of the
daily caloric requirement of the average person. Beer, itself,
lerate quantities is not fattening, if not taken with excessive
nts of food. The carbohydrates present in beers are mainly
se and dextrin, both of which are changed by the human
ve processes into glucose. Most of the malt liquors, like lager
the most prevalent malt liquor sold in several countries) and
ale, contain carbon dioxide gas which is refreshing and thirst
ing. Other malt liquors, like stock ale, etc., are lacking in
dioxide and are, in spite of their bitter and malty character,
of a vinous nature. Light beer usually contains somewhat less
ydrate and somewhat more alcohol than dark beer.

led beer, as sold in the United States, is being subjected in
ewery to a pasteurization process which destroys the last
of yeast or other microörganisms present. Consequently,

* Data supplied by "Jacob Ruppert," New York.

bottled beer can be kept for weeks at room temperature without turning cloudy or sour.

Keg beer (*i. e.*, draught beer, sold in resturants) is not subjected to any pasteurization, and, therefore, would spoil when exposed for only a very few days to room temperature, due to the rapid development of the small trace of yeast and microörganisms still present. Keg beer, consequently, has to be refrigerated from the time it leaves the brewery until it is consumed. Usually there is no difference in the composition of keg and bottled beer.

Bock beer is the name of a lager beer of dark color. It is usually sold at Easter time and represents a beer made with the use of more malt and hops per barrel, and, therefore, often contains more alcohol and more carbohydrates than regular lager beer.

Ale, porter and **stout** are malt liquors differing from lager beer mainly in the use of another type of yeast, higher fermentation and storage temperatures, thereby producing a particular flavor. Also, the hops are sometimes applied in such a way that a very pronounced hop aroma is produced. Ale, porter and stout are usually only slightly higher in alcohol and carbohydrate content than regular lager beers, but certain brands of stock ale, export stout, etc., exceed in this respect even the strongest luxury lager beers. Malt liquors in general produce a distinctly alkaline ash.

Wines.—Wines are produced in all parts of the world in which grapes grow and where temperate climate prevails. They vary considerably in taste, bouquet, color and composition, depending mainly upon the characteristics of the grape from which the juice is pressed and the exact processing methods connected with the fermentation and aging of the wine. There are many species of grapes: Muscatel, Zinfandel, Concord, Diamond, Delaware, Riesling, etc.; but depending on soil, fertilization, altitude, climate, control of insect pests and vintage year, great differences are observed in the quality and aroma of the grapes and of the resulting wine.

Wines contain usually two to four times the percentage of alcohol present in malt liquors, but are much lower in carbohydrates. As a matter of fact, many of the ordinary wines, such as Claret and Moselle wines, are practically free from carbohydrates. Sweet wines, of course, have a considerably higher carbohydrate content.

Yeast cannot produce more than about 14 per cent alcohol in any saccharine fluid—even if additional sugar is present. The term "*dry*," in contrast to "*sweet*," refers solely to the degree of sweetness presented to the taste, a "dry" wine being less sweet than a "sweet" wine.

For classification, wines may be subdivided as follows:

Acid Wines.—All wines contain tartaric, lactic and other acids. They vary greatly as to the quantity of their acid content, Moselle wines being the most acid. Like most vegetable products, wines have, in spite of their acid taste, an alkaline ash. The following wines are arranged in the order of their increasing acidity: Sherry,

ret, madeira, burgundy, sauternes, rhine and moselle wine. e most acid wines are also the ones lowest in carbohydrate.

tic Wines.—Certain species of grapes, such as muscatel, r, etc., are exceedingly pronounced in flavor and transmit ma to the wine. Other wines, principally Italian vermouth, t, etc., are prepared from wines with the addition of various nts, such as cinnamon, which lend their characteristic o the wine.

ect" Wines.—Wines from Bordeaux, Sauternes and the Rhine xcellent flavor and quality. They are esteemed by connois- l over the world as table wines because of their mild, agreeable d effect. It would fill volumes to enumerate all of the names n the labels of these popular wines, each small village insist- prominent display of its name on the labels of the bottles, ven stating in addition the name of the exact location of the rd from which the grapes have been harvested.

gh or Astringent Wines.—These are usually red wines, which aracterized by the presence of tannin substances, derived from the grape skins, and, therefore, are considered to be y constipating. Claret and Burgundy are typical red wines.

rkling Wines.—Sparkling wines (champagne, sparkling bur- , etc.) were originated in France, but now are produced from ines of many countries either by bottle fermentation (natural) the impregnation (artificial) of the wine with carbon dioxide. egrees of sweetness can be obtained in champagnes, from the st" to the sweetest.

ong Wines (Fortified Wines).—Port and sherry are wines which roduced by adding distilled liquor, usually either pure alcohol ung brandy, to the fully or partially fermented grape juice. nding upon the amount of residual sugar present in the wine the distillate is added, either dry or sweet sherry or port wines btained. Sometimes evaporated (sun-dried) grape juices are d to obtain sweetness. Exceedingly warm storage of the sherry rt wines is also responsible for the characteristic taste of these . Malaga and madeira wines are also frequently fortified.

stilled Liquors.—Distilled liquors owe their stimulating action e high percentage of the alcohol present. Other ingredients, he sugar contained in cordials and the oil of peppermint con- d in Crême de Menthe, sometimes are present and tend to the combination of components more agreeable to the senses. rs are made in what seems to be an almost uncountable variety stes and flavors. Some of the distilled liquors are only used voring agents, such as bitters (orange bitters), etc.

stilled liquors usually have an alcohol content of 20 to 40 ent by weight; in some cases though, they are not consumed ch strength. In highballs and cocktails distilled liquors are med, because of their mixture with water or other diluents, in a diluted condition that their alcoholic concentration is often ar to that of wine.

For certain distilled liquors, principally whiskies, brandies and rums, several years of aging are required to develop the proper flavor and appeal. In the case of rye and bourbon whiskies, the type of wood used for the barrel in which the liquor is aged and the degree of charring applied to the barrel have an important effect on the flavor of the liquor produced. Tannin and coloring substances, wood caramel products and soluble wood components contribute a great proportion of the flavor finally present. For liquors made from pure 95 per cent alcohol, such as most of the cordials, no aging is required, the beverage being ready for consumption soon after adding the flavoring and compounding.

Distillates from Fermented Fruit Juices.—The distillate from grape wine is designated as brandy or cognac, the distillate from cider is applejack or apple brandy, the distillate from fermented plums is plum brandy, from fermented cherries is white cherry brandy, etc.

Distillates from Fermented Saccharine Solutions.—The distillate from fermented sugar cane juice or molasses is known as rum; the distillate from palm wine is called arrac, highly esteemed as an addition to hot tea. Scotch whiskey is distilled from the fermented infusion of a specially aromatized (smoky) barley malt; rye whiskey is distilled from the fermented infusion of barley malt, rye malt and rye; bourbon whiskey is distilled from the fermented infusion of malt and corn; Irish whiskey exists in two varieties, one of which is distilled from potatoes and is considered a cheap type of whiskey, the other is very similar to Scotch whiskey and likewise is made from barley malt.

Distillates from Alcoholic Infusions of Aromatic Seeds and Herbs.—When aromatic substances like caraway seeds, juniper berries, anise seeds, mint, orange peels, etc., are steeped in a mixture of rectified alcohol and water and are distilled, the distillates contain the respective flavor and represent such liquors as kümmel, gin, aquavit, anise, etc. Sometimes sugar, coloring matter of additional flavoring substances, such as alcoholic fluid extracts of angelica, cocoa, vermouth, etc., are being added to the distillate, and either bitters or cordials, such as crême de menthe, crême de cacao, curaçao, anisette, benedictine, etc., are obtained. If fresh fruits are sweetened and macerated in the presence of pure alcohol, the filtrate represents such "fine cordials" as cherry brandy, apricot brandy, etc. Eggnog is the sweetened mixture of brandy with the yolk of egg. Sweet cordials are taken usually after dinner.

COMPOSITION AND FUEL VALUES OF ALCOHOLIC BEVERAGES.

Introduction.—In evaluating the caloric intake of the individual, his alcoholic habits should be taken into consideration. It is for the convenience of the nutritionist that this table has been elaborated. It provides in readily available form authentic data on the composition of various alcoholic preparations. This should enable

an to discuss these matters competently or to prescribe tly those beverages which are desirable.

llowing table contains the composition and fuel values of l internationally known alcoholic beverages. With few ex- trade-marked products have been omitted. These analyses ost recent date and are offered with an assurance of their .

d variations of composition are found in any one of the enu- beverages, consequently only average values are presented.

oldface numerals indicate the number of grams and Calories erage portion. The *plain numerals* indicate the percentage tion thereof in weight per cent.

TABLE 82.—**Beverage Glass Equivalents.**

1 Cordial glass (fluid)	=	20 cc.
1 Brandy glass (fluid)	=	30 cc.
1 Sherry glass (fluid)	=	30 cc.
1 Wine glass (fluid)	=	100 cc.
1 Cup* (fluid)	=	236 cc.

E 83.—**Composition and Fuel Values of Alcoholic Beverages.**†

Items.	Size of portion. Grams.	Household measure.	Value of portion. Alcohol.	Carb.	Prot.	Fat.	Cal.
lt Liquors:‡							
American:							
Ale, cream ale, carbonated ale	230	1 cup	**8.9**	**8.0**	**1.1**	**—**	**100**
			3.8	3.5	0.5	—	
Bock beer	230	1 cup	**10.3**	**13.8**	**1.6**	**—**	**135**
			4.5	6.0	0.7	—	
Lager beer (draught or bottle)	230	1 cup	**8.5**	**9.2**	**1.1**	**—**	**100**
			3.7	4.0	0.5	—	
Porter, stout . . .	230	1 cup	**13.8**	**11.5**	**1.3**	**—**	**150**
			6.0	5.0	0.6	—	
Stock ale, still ale, India ale . . .	230	1 cup	**13.8**	**11.5**	**1.3**	**—**	**150**
			6.0	5.0	0.6	—	
"3.2" beer	230	1 cup	**6.9**	**6.9**	**1.1**	**—**	**80**
			3.0	3.0	0.5	—	
European:							
Ale, porter, stout, English for export . .	230	1 cup	**13.8**	**11.5**	**1.3**	**—**	**150**
			6.0	5.0	0.6	—	
Bock beer and related special beers . .	230	1 cup	**10.3**	**13.8**	**1.8**	**—**	**135**
			4.5	6.0	0.8	—	
Lager beers, Central European, average quality	230	1 cup	**8.5**	**9.2**	**1.1**	**—**	**100**
			3.7	4.0	0.5	—	
Munich beer (usually dark)	230	1 cup	**8.0**	**10.3**	**1.3**	**—**	**105**
			3.5	4.5	0.6	—	

e cup referred to is the "Standard Measuring Cup."
rnished by "Jacob Ruppert," New York.
alt liquors usually contain about 0.2 per cent lactic acid and acid phosphates, 4 per cent by weight of carbon dioxide. There is also present about 0.2 per ineral salts. In general, the alcoholic percentage by weight of all malt liquors from 1.5 to 7 per cent.
ndicates negligible or absent.

TABLE 83. **Composition and Fuel Values of Alcoholic Beverages.** *(Continued.)*

Items.	Size of portion. Grams.	Household measure.	Value of portion Alcohol.	Carb.	Prot.	Fat.	[illegible]
I. **Malt Liquors:**—(Continued.)							
Pilsener beer (always light)	230	1 cup	**8.9**	**8.0**	**1.1**	**—**	[illegible]
			3.8	3.5	0.5	—	
Salvator, Maerzen beers	230	1 cup	**10.3**	**13.8**	**1.8**	**—**	[illegible]
			4.5	6.0	0.8	—	
Weiss beer . . .	230	1 cup	**4.6**	**4.6**	**1.1**	**—**	[illegible]
			2.0	2.0	0.5	—	
II. **Wines:**‡							
A. *American:*							
California red wines, claret, Zinfandel, Chianti, Burgundy, etc.	100	Wine glass	**10.0**	**0.5**	**0.2**	**—**	75
			10.0	0.5	0.2	—	
California white wines, Chablis, Riesling, Rhine	100	Wine glass	**10.5**	**0.5**	**0.2**	**—**	75
			10.5	0.5	0.2	—	
California white wine, sauterne . . .	100	Wine glass	**10.5**	**4.0**	**0.2**	**—**	90
			10.5	4.0	0.2	—	
Champagne from California and New York State	100	Wine glass	**11.0**	**3.0**	**0.2**	**—**	90
			11.0	3.0	0.2	—	
Sweet and dessert wines:							
Catawba (white) .	100	Wine glass	**13.0**	**12.0**	**0.2**	**—**	140
			13.0	12.0	0.2	—	
Muscatelle . . .	100	Wine glass	**15.0**	**14.0**	**0.2**	**—**	165
			15.0	14.0	0.2	—	
Port	100	Wine glass	**15.0**	**14.0**	**0.3**	**—**	165
			15.0	14.0	0.3	—	
Sherry	100	Wine glass	**15.0**	**8.0**	**0.3**	**—**	140
			15.0	8.0	0.3	—	
B. *European:*							
Bordeaux wine (French) . . .	100	Wine glass	**10.5**	**2.0**	**0.2**	**—**	80
			10.5	2.0	0.2	—	
Champagne, white, dry	100	Wine glass	**11.5**	**1.0**	**0.2**	**—**	85
			11.5	1.0	0.0	—	
Champagne, white, sweet	100	Wine glass	**11.0**	**10.0**	**0.2**	**—**	120
			11.0	10.0	0.2	—	
Claret (red), French, Italian or Spanish .	100	Wine glass	**8.0**	**0.5**	**0.2**	**—**	60
			8.0	0.5	0.2	—	
Madeira wine . . .	100	Wine glass	**14.0**	**3.0**	**0.2**	**—**	110
			14.0	3.0	0.2		
Moselle wine (German)	100	Wine glass	**8.5**	**0.5**	**0.2**	**—**	60
			8.5	0.5	0.2	—	
Rhine wine (German, like Hockheimer "hock")	100	Wine glass	**9.5**	**1.0**	**0.2**	**—**	70
			9.5	1.0	0.2	—	

‡ Wines contain from 6 to 20 per cent of alcohol by weight, depending upon the variety. They usually contain 0.5 to 1 per cent acidity from tartaric, lactic and phosphoric acids; also 0.1 to 0.3 per cent mineral salts. Additionally, they contain 0.5 to 1 per cent of glycerine. Red wines contain 0.1 to 0.3 per cent tannin.

— indicates negligible or absent.

83. Composition and Fuel Values of Alcoholic Beverages. (*Continued.*)

Items.	Size of portion. Grams.	Household measure.	Value of portion. Alcohol.	Carb.	Prot.	Fat.	Cal.
es:—(Continued.)							
auterne wine (French)	100	Wine glass	10.5	2.0	0.2	—	80
			10.5	2.0	0.2	—	
Sweet and Dessert Wines:							
Malaga (Spanish)	100	Wine glass	10.5	20.0	0.3	—	155
			10.5	20.0	0.3	—	
Marsala, Malvasia, Lacrimæ Christi Italian)	100	Wine glass	12.0	5.0	0.3	—	110
			12.0	5.0	0.3	—	
Port wine (Portuguese), Douro	100	Wine glass	15.0	6.0	0.3	—	130
			15.0	6.0	0.3	—	
Sherry, Amontillado, Tarragona, etc.	100	Wine glass	15.0	3.0	0.3	—	120
			15.0	3.0	0.3	—	
Tokay (Hungarian)	100	Wine glass	10.0	12.0	0.3	—	120
			10.0	12.0	0.3	—	
Vermouth (French)[1]	100	Wine glass	15.0	1.0	—	—	110
			15.0	1.0	—	—	
Vermouth (Italian), Dubonnet, etc.[1]	100	Wine glass	18.0	12.0	—	—	175
			18.0	12.0	—	—	
istilled Liquors:‡							
Absinthe (Swiss)	20	Cordial glass	7.0	—	—	—	50
			35.0	—	—	—	
Akvavit (Norwegian)	20	Cordial glass	7.0	0.2	—	—	50
			35.0	1.0	—	—	
Applejack	30	Brandy glass	10.5	—	—	—	75
			35.0	—	—	—	
Arrac (Palm wine district)	20	Cordial glass	7.0	—	—	—	50
			35.0	—	—	—	
Bacardi rum	30	Brandy glass	10.5	—	—	—	75
			35.0	—	—	—	
Bitters: Angostura, orange, Boonekamp, etc.	4	1 teaspoon	1.4	—	—	—	10
			35.0	—	—	—	
Brandy, apple	30	Brandy glass	10.5	—	—	—	75
			35.0	—	—	—	
Brandy, apricot	30	Brandy glass	9.0	—	—	—	65
			30.0	—	—	—	
Brandy, California	30	Brandy glass	10.5	—	—	—	75
			35.0	—	—	—	
Brandy, cherry	30	Brandy glass	13.2	—	—	—	90
			44.0	—	—	—	
Brandy, cognac (French)	30	Brandy glass	10.5	—	—	—	75
			35.0	—	—	—	
Gin, dry	30	Brandy glass	10.5	—	—	—	75
			35.0	—	—	—	

ermouth and Dubonnet contain extracts of herbs, giving them distinctive rties.

Liquors contain from 18 to 50 per cent alcohol, depending upon the variety usually contain less than 0.1 per cent fusel oils. Liquors made from high ed alcohol are free of fusel oils. Esters and essential oils amount to less than er cent and acids less than 0.1 per cent.

indicates negligible or absent.

Table 83.—Composition and Fuel Values of Alcoholic Beverages (*Continued.*)

Items.	Size of portion. Grams.	Household measure.	Value of portion. Alcohol.	Carb.	Prot.	Fat.	Cal.
III. Distilled Liquors: (Continued.)							
Kirschwasser . . .	20	Cordial glass	**7.0**	—	—	—	50
			35.0	—	—	—	
Liqueurs, Cordials:							
Anisette	20	Cordial glass	**7.0**	**7.0**	—	—	80
			35.0	35.0	—	—	
Apricot brandy . .	20	Cordial glass	**6.0**	**6.0**	—	—	55
			30.0	30.0	—	—	
Benedictine . . .	20	Cordial glass	**6.6**	**6.6**	—	—	75
			33.0	33.0	—	—	
Chartreuse . . .	20	Cordial glass	**6.6**	**6.6**	—	—	75
			33.0	33.0	—	—	
Cherry brandy . .	20	Cordial glass	**4.6**	**6.0**	—	—	55
			23.0	30.0	—	—	
Crême apricot . .	20	Cordial glass	**6.0**	**6.0**	—	—	65
			30.0	30.0	—	—	
Crême de cacao . .	20	Cordial glass	**4.0**	**6.0**	—	—	50
			20.0	30.0	—	—	
Crême de menthe .	20	Cordial glass	**6.0**	**7.0**	—	—	70
			30.0	35.0	—	—	
Crême de Violette .	20	Cordial glass	**6.0**	**6.0**	—	—	65
			30.0	30.0	—	—	
Crême Yvette . .	20	Cordial glass	**6.0**	**6.0**	—	—	65
			30.0	30.0	—	—	
Curaçao (orange peel)	20	Cordial glass	**6.0**	**4.0**	—	—	60
			30.0	20.0	—	—	
Kümmel (caraway seed)	20	Cordial glass	**6.0**	**2.0**	—	—	50
			30.0	10.0	—	—	
Maraschino (cherry)	20	Cordial glass	**6.0**	**8.0**	—	—	75
			30.0	40.0	—	—	
Swedish punch . .	20	Cordial glass	**6.0**	**5.0**	—	—	60
			30.0	25.0	—	—	
Rum, Jamaica, Martinique	30	Brandy glass	**10.5**	—	—	—	75
			35.0	—	—	—	
Sloe gin	30	Brandy glass	**8.4**	**4.5**	—	—	75
			28.0	15.0	—	—	
Vodka	20	Cordial glass	**9.0**	—	—	—	65
			45.0	—	—	—	
Whiskies: Bourbon . .	30	Brandy glass	**12.0**	—	—	—	85
			40.0	—	—	—	
Irish	30	Brandy glass	**12.0**	—	—	—	85
			40.0	—	—	—	
Rye	30	Brandy glass	**12.0**	—	—	—	85
			40.0	—	—	—	
Scotch . . .	30	Brandy glass	**10.5**	—	—	—	75
			35.0	—	—	—	
IV. Miscellaneous:							
Cider, American:							
Sweet	230	1 cup	**0.2**	**24.1**	—	—	100
			0.1	10.5	—	—	
Fermented (hard) . .	100	Wine glass	**5.2**	**1.0**	—	—	40
			5.2	1.0	—	—	
Grenadine syrup . .	20	Cordial glass	—	**12.0**	—	—	50
			—	60.0	—	—	
Maraschino cherry juice .	5	1 teaspoon	—	**1.8**	—	—	7
			—	35.0	—	—	
Raspberry syrup . . .	20	Cordial glass	—	**12.0**	—	—	50
			—	60.0	—	—	

— indicates negligible or absent.

ies, it is essential for the physician to be conversant with
tituents of mixed alcoholic beverages. This is particularly
y for the practitioner in a large city or for one practising
a foreign element. Table 84 presents qualitative ingredi-
the various common, mixed alcoholic beverages. Efforts
en made to delete purely local or fanciful mixtures or those
orary vogue.

84.—Qualitative Ingredients of Mixed Alcoholic Beverages.*

: These are iced and diluted mixtures of distilled liquors with fruit juices
rtain wines (Vermouth, etc.).
he: Absinthe, water, syrup, Angostura bitters.
der: Gin, crême de cacao, cream.
ack: Applejack, grenadine, lemon juice.
: Gin, French vermouth, orange bitters.
ii: Bacardi rum, grenadine, lime juice.
y: Brandy, gin, Angostura bitters.
Gin, French or Italian vermouth, orange juice.
pagne: Champagne, sugar, Angostura bitters, slice of orange, lemon peel.
r Club: Gin, raspberry syrup, lemon juice, egg-white.
iri: Bacardi rum, sugar, lemon or lime juice.
nnet: Gin, Dubonnet, orange bitters.
esidente: Bacardi rum, French vermouth, grenadine, Curaçao.
Gin, orange bitters.
efruit: Gin, grapefruit juice, lemon juice.
ana: Bacardi rum, pineapple juice.
l: Gin, Italian vermouth, maraschino, grapefruit juice.
Rose: Applejack, grenadine, lime juice.
ey Club: Gin, crême de noyau, Angostura bitters, orange bitters, lemon juice.
hattan: Rye whiskey, Italian vermouth, Angostura bitters.
tell: Martell brandy, honey, lime juice.
tini, Dry: Gin, French vermouth.
tini, Sweet: Gin, Italian vermouth, orange bitters.
ry Widow: Gin, French vermouth, absinthe, benedictine, Angostura bitters.
-fashioned: Rye whiskey, Angostura bitters, sugar, seltzer.
nge Blossom: Gin, orange juice.
dise: Gin, apricot brandy, orange juice.
ect: Gin, French and Italian vermouth.
Lady: Applejack, gin, grenadine, lime juice, egg-white.
cess: Apricot brandy, sweet cream.
me: Gin, French vermouth, Dubonnet.
car: Brandy, cointreau, lime juice.
Gin: Sloe gin, French and Italian vermouth.
Kiss: French and Italian vermouth, Dubonnet, orange juice.
and Jerry: Brandy, rum, egg, sugar.
skey Sour: Rye whiskey, sugar, lemon juice.

ers: Mixtures of wines or whiskey with fruit juices, sugar and non-alcoholic
luents.
ndy: Brandy, fruit, sugar, seltzer.
et: Claret, fruit, sugar, seltzer.
Port wine, fruit, sugar, seltzer.

ndicates negligible or absent.
he compositions and fuel values of mixed alcoholic beverages necessarily vary
y and are not capable of reliable analytical presentation.

Table 84.—Qualitative Ingredients of Mixed Alcoholic Beverages (*Continued.*)

Cobblers:—(Continued.)

Rhine: Rhine wine, fruit, sugar, seltzer.
Sherry: Sherry wine, fruit, sugar, seltzer.
Whiskey: Whiskey, fruit, sugar, seltzer.

Collins: Mixtures of gin, fruit juices, sugar and non-alcoholic diluents.

Tom Collins: Gin, lemon juice, sugar, seltzer.
John Collins: Hollands gin, lemon juice, sugar, seltzer.

Eggnogs: Mixtures of distilled liquors, eggs, milk and sugar.

Brandy: Brandy, rum, whole egg, milk, sugar.
Rye: Rye whiskey, whole egg, milk, sugar.
Scotch: Scotch whiskey, whole egg, milk, sugar.
Sherry: Sherry wine, rum, whole egg, milk, sugar.

Fizzes: Mixtures of gin or brandy, fruit juices, eggs, sugar and non-alcoholic diluents.

Brandy: Brandy, lemon juice, sugar, seltzer.
Gin: Gin, lemon juice, sugar, seltzer.
Golden: Gin, egg-yolk, lemon juice, sugar, seltzer.
Grenadine: Gin, grenadine, lemon juice, sugar, milk, seltzer.
New Orleans: Gin, egg-white, orange flower water, sugar, cream, seltzer.
Royal: Gin, whole egg, lemon juice, sugar, seltzer.
Silver: Gin, egg-white, lemon juice, sugar, seltzer.
Sloe Gin: Sloe gin, lemon juice, sugar, seltzer.

Flips: Mixtures of distilled liquors, eggs, sugar and nutmeg.

Brandy: Brandy, whole egg, sugar, nutmeg.
Port: Port wine, whole egg, sugar, nutmeg.
Sherry: Sherry wine, whole egg, sugar, nutmeg.
Whiskey: Scotch or rye whiskey, whole egg, sugar, nutmeg.

Highballs: Mixtures of distilled liquors and non-alcoholic diluents.

Bourbon: Bourbon whiskey, seltzer or ginger ale.
Gin: Gin, seltzer or ginger ale.
Rye: Rye whiskey, seltzer or ginger ale.
Scotch: Scotch whiskey, seltzer or ginger ale.

Rickeys: Mixtures of gin, lime juice and non-alcoholic diluents.

Gin: Gin, lime juice, seltzer.
Puerto Rico: Gin, grenadine, lime juice, seltzer.
Sloe Gin: Sloe gin, lime juice, seltzer.

Sours: Mixtures of distilled liquors, lemon juice, sugar and non-alcoholic diluents.

Applejack: Applejack, lemon juice, sugar, seltzer.
Bourbon: Bourbon whiskey, lemon juice, sugar, seltzer.
Brandy: Brandy, lemon juice, sugar, seltzer.
Gin: Gin, lemon juice, sugar, seltzer.
Rye: Rye whiskey, lemon juice, sugar, seltzer.
Scotch: Scotch whiskey, lemon juice, sugar, seltzer.

Fancy Drinks:

Horses Neck: Ginger ale, lemon peel.
Mamie Taylor: Scotch whiskey, lime juice, ginger ale.
Mint Julep: Bourbon whiskey, water, sugar, mint sprigs.
Planters Punch: Jamaica rum, grenadine, Curaçao, lemon juice.
Whiskey Punch: Whiskey, water, sugar, lemon juice.
Whiskey Smash: Whiskey, water, sugar, mint sprigs.
White Plush: Rye whiskey, maraschino, whole egg, milk.
Widow's Dream: Benedictine, whole egg, cream.

Pousse Cafés:

Cream: Maraschino, crême de menthe, yellow chartreuse, brandy.
Cream: Raspberry syrup, anisette, crême Yvette, yellow chartreuse, green chartreuse, brandy.

…en most commonly signifies white of egg but may be used … simple protein soluble in water or salt solutions and co… by heat.

…uenized milk consists of 6 ounces of chilled whole milk to … or 2 whites of egg have been added after being clipped with … and strained through cheesecloth to remove stringy parts. …g-whites are either stirred into the milk with a fork or shaken …sly in the presence of cracked ice.

…menized tea is iced tea to which 1 white of egg per cup has …lded as in the preparation of albumenized milk.

…min is the chemical term for a specific type of protein which … in egg-white, blood serum, etc.

…uentary (Italian) Paste is a dried dough of wheat flour used …king of macaroni, spaghetti, vermicelli, noodles, etc.

…ed foods are those which are cooked in an oven by the appli… of dry heat, usually in an uncovered pan.

…f tea is a clear soup; an aqueous extract of lean beef obtained …olonged boiling followed by straining. The term "broth" is … used for this extract. Although it serves to introduce a … fluid into the body and stimulate the appetite, it possesses …other nutritive value.

…cuits are generally sweetened cookies baked so as to remove …ically all the moisture and are usually wafer-like and crisp in …re. In the United States the word "biscuit" also applies to a …, baked mass of unsweetened, leavened dough, soft in texture …ontaining considerable moisture.

…led foods are those which have been cooked by boiling in water.

…ogna consists generally of beef, veal and pork trimmings …ed fine, spiced and stuffed into large wide casings. Ham …a contains large cubes of lean pork shoulder or shoulder butt.

…illon is a broth or clear soup which can be an extract of meats, …y or fish.

…ned foods are those which have been preserved by steeping or …ting in brine.

…iled foods are those cooked by direct exposure to heat over …en fire or other source of direct heat.

Broth is a fluid food; a thin soup in which meat and usually vegetables are boiled and macerated. Frequently, it has little or no caloric value.

Buns are a well-known class of small, light, sweet and generally round style of bakery product, made essentially from wheat flour and containing other ingredients. Buns have a texture similar to that of bread.

Cake consists of a sweetened mixture of flour, shortening and other ingredients, leavened or unleavened, and baked into a loaf or mass of any size or shape.

Canned foods are products preserved in air-tight containers with or without the addition of sugar, acid and condiments and subjected to heat.

Cereals are substances derived from plants yielding grain or farinaceous seeds used as foods, such as wheat, maize, rye, oats, barley, millet, etc.

Chipped beef is sliced, dried beef.

Compounded cheese is a blend of cheddar cheese and milk or milk products (as whey) usually accomplished with an emulsifying agent; sodium chloride and citrate are frequently added. *Process cheese* is a cheddar cheese which has been ground, mixed with an emulsifying agent and seasoned with salt to form a product which can be spread.

Condensed milk is concentrated milk preserved by the addition of about 40 per cent of cane sugar.

Consommé is a clear meat-extract soup made rich by long and slow cooking.

Cookies, in the United States, are a form of small, flat, sweetened cakes with higher moisture content than biscuits.

Cottage cheese is a home-made or commercial cheese made from curdled milk; "Dutch cheese."

Crackers, in the United States, are thin, crisp, unleavened pieces of dough, unsweetened or slightly sweetened and baked thoroughly to remove practically all the moisture.

Cream cheese is a soft cheese prepared from curd made from new milk to which a certain quantity of cream is added; also cheese in general made from whole milk to which extra cream has been added.

is a cake of leavened dough, sweetened, spiced and fried at or oil. The term "cruller" comes from the Dutch word, ." meaning curled. In contrast to doughnuts, crullers are curled or gashed crosswise before cooking.

y products" is a term applied to milk and all the foods or made from milk. Included among these foods are milk, lk, buttermilk, cream, butter, all varieties of cheese, ice- cidophilus milk, condensed milk, evaporated milk, powdered milk, malted milk, whey, casein, lactose and the fermented koumiss, yoghurt, etc.).

tics is the application of the science of nutrition to the of all individuals under differing circumstances of health ease.

hnut is a cake of varied shape, made of leavened, sweetened quently spiced dough. It is cooked by frying in deep fat or sually it is ring-shaped.

d beef consists generally of the thick flank of beef, which en set in a pickle of salt, sugar and saltpeter for about ten rteen days and then smoked like ham.

milk—often called powdered milk—contains a low degree isture, generally about 2 per cent, and is available in three l classes: whole milk, partly skim and skim milk.

porated milk is the product resulting from the evaporation of 60 per cent of the water from whole cow's milk. It is hom- zed, and sterilized in hermetically sealed tins, and must con- not less than 7.8 per cent milk fat.

ds are those substances which, when taken into the body, heat and energy, supply the elements for growth and replace- of waste, and regulate the body processes.

ed foods are those which are cooked by immersion into hot fat

it is the edible portion of a perennial or woody plant, consist- the ripened seeds and the surrounding tissues. Fruit usually ins about 80 per cent water, a low percentage of proteins and sociated with a relatively high carbohydrate content. Fruit important carrier of mineral matter and vitamins, especially in C.

it albumen consists of the juice of half an orange and half on together with one-half cup of chopped ice and one-half tea- ful of sugar to which 1 or 2 whites of egg are added as in the ration of albumenized milk.

Fruit juice is the unfermented liquid obtained from the first pressing of sound, ripe, fresh fruit or its pulp, and conforms in taste to the fruit from which it is obtained.

Fruit juice salad dressing consists of a cupful of pineapple or other tart fruit juice to which 2 level teaspoonsful of cornstarch have been added for thickening.

Grape juice is the unfermented juice of sound, ripe grapes. It is obtained by a single pressing of the fruit with or without the aid of heat and with or without the removal of insoluble matter.

"Homogenized" foods are foods which have been subjected to a special process which renders them easily digestible by breaking the food cells, releasing the contained nutriment and reducing the fibers to minute particles without removing the bulk.

Jams are a type of sweet preserves in which the whole fruit is cooked and reduced to a pulp in a concentrated sugar solution.

Legume is a two-valved seed-vessel having its seeds attached to one side only; any plant of the bean family, such as peas, beans, lentils, tamarinds, peanuts, etc.

Marmalade is a semi-liquid fruit preserve in which the pulp or juice is boiled with portions of the rind.

Mineral oil dressing consists of equal parts of mineral oil and vinegar, beaten with a little ice, salt and pepper, then served at once after removing the ice.

Mineral oil French dressing consists of a well-beaten mixture of mineral oil (4 T.), vinegar (2 T.), salt ($\frac{1}{2}$ t.), pepper ($\frac{1}{8}$ t.) and paprika.

Muffin is a cake, usually round, and is baked in a cup-cake pan. It is unsweetened and leavened to give an open porous texture.

Nutrition may be defined as the sum of all physical and chemical reactions involved in the stimulation of growth and maintenance of proper body function.

Orange juice is the unfermented juice obtained from sound, ripe, sweet oranges. It may contain a portion of the pulp and of the volatile oil.

Pan-broiled foods are those cooked in a hot frying pan or griddle without adding any fat.

Pan-fried foods are those cooked in a small quantity of fat or oil on a metal plate.

led foods are those which are cooked by placing the article water and gradually raising the temperature to the boiling t is then removed, plunged into cold water and left until arboiling is a method of partial cooking.

es are articles of food made of a paste of flour and shortening ed to a light, flaky product.

nized milk is milk to which an enzyme has been added for ation of protein digestion. The peptonizing powder is dis- n a gill of cold water in a quart-sized glass jar. After a pint has been added, it is thoroughly mixed. The jar is placed cepan containing water at least to the level of the milk and perature of 115° F. which is comfortably warm to the hands. mperature is maintained for five to ten minutes according to ree of peptonization required. The jar is transferred to a cold water and subsequently stored on ice.

led foods are those which have been preserved in brine or in r.

heese is generally considered to be the same as cottage cheese, e two may be differentiated by the fat content.

ed cream cheese is considered a synonym for cream cheese.

served foods are those prevented from decomposition or fer- tion by some preservative, such as salt, sugar, etc. In the f preserved fruit, the preservative is sugar.

cess cheese—see Compounded Cheese.

réed foods are usually made by boiling and rubbing them gh a sieve, as a purée of fish, peas or prunes.

sted foods, as formerly implied, referred to those foods cooked spit before an open fire, but today roasted foods invariably those which have been baked in an oven.

ls are generally a variety of fancy bread, usually in the form all, pointed oval, round or semi-cylindrical shapes, which are hot as a rule.

ines are a type of soda cracker about 2 inches square with a portion of shortening, salted on the surface and baked so he top of the biscuit is white and the bottom is quite brown.

sage is a product of varied style which consists primarily of ed meat, generally beef or pork or both, cured, spiced and d into beef, sheep or hog casings. It may be cooked in some and in others eaten fresh.

téed foods are, as applied to meats or fish, those prepared by a d practically the same as "dry frying." The food is "tossed" ving the pan quickly backward and forward over a brisk fire.

*Skim milk** is milk from which most of the cream has been removed. This decreases the fat percentage and raises slightly the percentages of proteins and sugar.

Smoked foods are usually meats which are cured by a mixture of salt, saltpeter and sugar, or sugar or salt alone, and then preserved by wood smoke.

Soft drinks are divided into two classes, aërated table waters and effervescent beverages. The latter are flavored and are known in the United States as carbonated beverages, also as soda water. Natural and synthetic flavors are used. Natural flavors are from fruits, nuts, roots, herbs, bark and leaves of plants. Synthetic flavors are made in the laboratory. Aërated waters are essentially non-alcoholic beverages artificially saturated with carbon dioxide.

Spiced foods are those having an aromatic or savory taste produced by the addition of spices.

Steamed foods are those prepared by cooking in steam.

Stewed foods are those prepared by simmering in a small quantity of water.

Strained foods are vegetables, fruits or cereals which have been precooked in the majority of instances and have been put through a sieve of some type with varying sized apertures. By this process a greater or lesser amount of the fiber of the food is mechanically removed. This renders the food particularly adaptable to feeding of infants and children as well as to certain gastro-intestinal conditions in the adult.

"Thrice-cooked" vegetables (washed) are any vegetables cooked under the following conditions: Boiled in three successive waters, throwing away each and all of the water every time. After the second water has been completely discarded, additional hot water is to be added to meet the necessary boiling requirements to render the food edible. In this manner nearly all soluble carbohydrate is removed. When 3 per cent vegetables are so prepared they are considered caloric-free. This type of vegetable is particularly useful in diabetes or obesity.

Tomato pomace is the dried residue left after the preparation of tomato juice.

Vegetables are parts or the whole of herbs used chiefly for culinary purposes.

Vitamin is a term used to designate certain organic compounds occurring in natural foods which are necessary for normal development, structure or function, and are physiologically effective in minute amounts.

* The term "skimmed milk" is not acceptable.

INDEX

A

C

H

M

N

W